



FRIDAY, MARCH 1.

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Contributions.

Increase of Stock of the Boston & Albany.

TO THE EDITOR OF THE RAILROAD GAZETTE:

You have mentioned and commented upon the fact that the Boston & Albany has requested permission to increase its capital stock from \$20,000,000 to \$30,000,000. The disposition of the money to be received by the sale of this extra stock cannot be criticised—to retire maturing bonds and pay for betterments—but I would like to call attention to the conditions of sale and the reasons for them. It is proposed to sell this issue to stockholders of record at par, or at about half of its value in the open market. It is easy to show that the transaction will mean an additional, though small, burden upon the net earnings of the road. A brief table will show this.

Present charges upon earnings are:

Interest on bonds.....	\$662,900
Eight per cent. dividend on \$20,000,000.....	1,600,000
	\$2,262,900
After issue of the extra stock and the retirement of \$7,000,000 of bonds due, the account will stand:	
Interest on bonds.....	\$192,900
Eight per cent. dividend on \$30,000,000.....	2,400,000
	\$2,592,900
Less interest at 4 per cent. on \$3,000,000 expended for betterments.....	120,000
	\$2,472,900

Showing an increase of \$200,000 in the total charges upon net earnings above the present amount. In like manner, if we suppose \$5,000,000 stock issued and sold at 200, we shall find that the difference between that plan and the one proposed is a loss to the income of the road of about \$400,000 yearly. All of which is, of course, clearly seen by the officials of that company.

If it was for a moment supposed that the present dividends were to be reduced in order that the same total amount of earnings should be then divided between \$30,000,000 as now between \$20,000,000, there would be no need of the transaction. The stockholders would gain in cash and lose in dividends. But the gist of the matter lies in the fact that the company expects to continue 8 per cent. upon the additional capital. It feels sure that it can earn the extra yearly charge of \$400,000, which is just 2 per cent. upon the present stock. So the situation resolves itself into this: that the company, in order to pay 2 per cent. more upon its stock, takes this roundabout course instead of funding its needed \$10,000,000, and boldly advancing its dividend to 10 per cent.

Why does it not do this? I think the real explanation is the blind unreasoning prejudice of the public against high dividends *per se*. This is really the secret cause of much stock watering. If a railroad should pay 14 per cent. there would immediately be a cry that the public were being swindled, even in the East. The truth being, as every student knows, that it is perfectly possible for a road exceptionally well situated and managed to pay such a dividend, and at the same time give better service at half the rates of another company scarce earning its fixed charges. The shares of the Chemical Bank are quoted above \$3,000 each and yet borrowers there pay no more than at other banks. If we could educate the public mind to allow the rates of dividends to fix themselves higher or lower, and at the same time consider the rates of freight or fares as a separate question, we should at once clear up a part of our muggy financial atmosphere. If companies did not give good service while continuing to pay high dividends, the facts would clearly appear and competition soon bring a reform. If the Boston & Albany can fairly earn 10 per cent., and wishes to pay it, by all means let the fact be honestly stated, so that all can understand it, and not be covered up by a lot of book-keeping, which amounts to the same thing.

JUDEx.

[We agree with most of this. The chance of dividing more money among stockholders without

offending public sentiment is undoubtedly a leading motive in the minds of the advocates of the project. It is also true that this public sentiment is based on mistaken ideas, exactly as is described by our correspondent. It is desirable that public sentiment on this point should be educated. Any attempt to evade its action savors a little of dishonesty on the part of the railroad and postpones the education of the public. But we cannot admit that the proposed action of the Boston & Albany is an evasion; still less that it involves dishonest statements or tricks of book-keeping. If the stock were issued for nothing, there might be room for this charge. But it is to be paid for at its face value. The Boston & Albany will simply be paying eight per cent. dividends on a larger amount of stock than before; but the new stock will have been paid up on the same terms as the old. The road is enabled to pay its debts, which is a good thing; it divides more money, but there are no false pretenses about it. All that can be fairly said is that the company does not go out of its way to educate the public or clear the muggy financial atmosphere. To this charge the authorities of the Boston & Albany would doubtless reply that they were not running an educational institution, but a railroad; and that there is no reason why they should go out of their way and perhaps incur hostility for the sake of a principle which, after all, is no particular concern of theirs. We think that they would be fully justified in this position.—EDITOR RAILROAD GAZETTE.]

Train Accidents in January.

COLLISIONS.

REAR.

1st, on Chicago & Alton, near Kansas City, Mo., freight train ran into the rear of a preceding freight, wrecking 4 cars, which caught fire and were consumed.

4th, very early, on Union Pacific, near Medicine Bow, Wyo., a freight train which had stopped to cool a hot box was run into by a closely following freight train at the bridge over Medicine Bow Creek, the caboose and 2 cars being tipped off into the creek. The wreck caught fire and, together with the bridge, a wooden structure, was consumed. Two trainmen injured and a man riding in the caboose killed. A flagman was sent back, but apparently his signals were not observed.

6th, on Illinois Central, at Cedar Hill, Miss., fast passenger train ran over a misplaced switch and into a box car standing on a siding, wrecking the engine and several cars. Engineer, fireman and several passengers injured.

7th, on New York, Lake Erie & Western, at Friendship, N. Y., freight train standing on the main track was run into by a following freight train. Engine, caboose and several coal cars were thrown over an embankment and wrecked.

8th, on Buffalo, Rochester & Pittsburgh, at Webster, N. Y., freight train ran over a misplaced switch and into some freight cars standing on a side track. The engine was derailed and badly damaged.

10th, on Chicago, St. Paul, Minneapolis & Omaha, near Lake Elko, Minn., freight train ran into the rear of a disabled freight, wrecking an engine and 19 cars, injuring a brakeman. It is stated that the flagman of the disabled train remained in the caboose until he sighted the approaching train, when it was too late to avert the disaster.

12th, on Boston & Albany, near State Line, Mass., empty engine ran into the rear of a freight train, wrecking the caboose.

15th, on Pennsylvania, near Columbia, Pa., freight train ran into a preceding freight, disabling an engine and demolishing a caboose. The latter caught fire from an overturned stove and was destroyed.

16th, on Chicago, Milwaukee & St. Paul, at Salvania, Wis., freight train collided with a flat car which a gale had blown out of a siding on to the main track. Engine and 18 cars were piled up in a bad wreck, killing the engineer and fireman.

16th, on Southwestern of Georgia, near Geneva, Ga., freight train broke in two and the rear section ran into the forward one, wrecking several cars.

17th, on Chicago, Milwaukee & St. Paul, at Windsor Station, Ill., a stock train running at speed struck a box car which a gale had blown out from a siding on to the main track. The engine and several cars were badly wrecked, former being overturned.

18th, on New York, Lake Erie & Western, near Susquehanna, Pa., freight train ran into rear of a preceding freight, damaging engine and caboose. The latter caught fire and was destroyed.

19th, on Cleveland, Lorain & Wheeling, at Wheeling, W. Va., a switch engine standing in the yard unattended started suddenly and ran out upon the main track a distance of 5 miles, where it dashed into the rear of a freight train, doing considerable damage.

19th, on Boston & Lowell, near Passumpsic, Vt., passenger train ran into the rear of a freight train standing on the main track, doing some damage and injuring a man riding in the caboose. A flagman sent back to signal the approaching train was not seen.

21st, on Philadelphia & Reading, near Locust Gap, Pa., passenger train ran into the rear of a freight train, doing considerable damage. Engineer fatally injured.

21st, on Union Pacific, near Rawlins, Wyo., passenger struck the rear portion of a freight train projecting over the main track from a siding, doing some damage.

22d, on Pennsylvania, in the yard at Columbia, Pa., an engine hauling a caboose ran into the rear of a standing freight train, doing some damage. Conductor killed. Both the engineer and fireman of the colliding engine were asleep. It is stated that they had been on duty 16 hours.

22d, on Union Pacific, at Omaha, Neb., a freight train ran into the rear of a local passenger train, doing some damage. Brakeman killed. There was a dense fog at the time.

26th, on Manhattan Elevated, at Ninth Avenue and 104th Street, New York City, passenger train ran into a preceding passenger train, doing some damage. Several passengers slightly injured. A dense fog prevailed at the time. A third train immediately after ran into the second.

28th, on Southern Pacific, near Luling, Tex., freight train ran into the rear end of a passenger train, which has been brought to a stop by a disabled freight train, wrecking an engine and the rear coach. One trainman injured by jump-

ing. The colliding freight train was flagged, but it was on a heavy down grade and was not controlled.

29th, on Atlantic & Pacific, near The Needles, Cal., passenger train ran over a misplaced switch and into the rear of a construction train standing on a side track, doing considerable damage and injuring a trainman. The road car caught fire from an overturned stove, but the flames were soon put out.

BUTTING.

2d, on Pittsburgh, Fort Wayne & Chicago, near Massillon, O., butting collision between two freight trains, owing to the misreading of orders, wrecking both engines and 5 cars.

2d, night, on New London Northern, near North Amherst, Mass., freight train broke in two, and the cars of the forward portion broke loose from the engine when approaching to recouple the detached section and dashed into it, doing some damage.

4th, on East Tennessee, Virginia & Georgia, near Dallas, Ga., butting collision between two freight trains, disabling both engines.

5th, on Pittsburgh & Western, near Carbon, Pa., butting collision between two freight trains, wrecking both locomotives. One trainman killed, 3 injured.

7th, on Central of Georgia, in Americus, Ga., butting collision between two freight trains, due to a misplaced switch, wrecking both locomotives and several cars, and injuring a brakeman.

7th, on Chicago & Eastern Illinois, near Watseka, Ill., butting collision between a passenger train and a freight.

8th, on St. Paul & Duluth, near Thompson Station, Minn., freight train broke in two. In returning to recouple the disjointed section, several cars broke loose from the locomotive and dashed into the rear portion, wrecking several cars and damaging a bridge.

10th, on Pittsburgh, Cincinnati & St. Louis, at Xenia, O., the rear portion of a freight train left standing on a side track, insecurely braked, started and ran back down grade on to the main track and collided with an approaching passenger train. The caboose and several freight cars were totally wrecked. Engineer hurt by jumping.

11th, on Central of New Jersey, at Woodbridge, N. J., passenger train ran over a misplaced switch and into the head of a freight train standing on a side track, wrecking both engines and 5 cars. Fireman hurt.

14th, about 2 a. m., on New York, Pennsylvania & Ohio, near Tallmadge, O., butting collision between an east-bound passenger train running at high speed and a west-bound freight train, demolishing both engines and telescoping 3 cars of the passenger train. Four trainmen and 4 passengers killed, 4 passengers and 2 trainmen injured. The wreck took fire and 6 of the dead bodies were burned up. The freight train had broken in two several miles east of Tallmadge and the engineer hauled the forward portion to the side track at that station and returned for the rear portion, leaving his fireman at Tallmadge to stop a passenger train due from the West. Upon reaching the detached cars the engineer called in his flagman from the east and started for Tallmadge. The fireman, on hearing the whistle signal, understood it was meant for himself, and at once started for his own train, but the passenger train overtook him before reached it. The particulars of this accident are more fully explained in the Railroad Gazette of Feb. 1.

17th, on Lake Shore & Michigan Southern, near Huron, O., collision between two construction trains on a curve, wrecking an engine and several cars.

17th, on Richmond & Danville, in the yards at Atlanta, Ga., butting collision between a switching freight train and an empty engine, damaging both locomotives; 2 trainmen injured.

18th, on New York, Pennsylvania & Ohio, near Kent, O., butting collision between two freight trains, demolishing both locomotives and a dozen cars; 1 trainman killed and several injured.

19th, on Southern Pacific, at San Fernando, Cal., a flat-car escaped control and ran down grade on to the main track and into the head of a passenger train, the engine of which was disabled.

19th, on East Tennessee, Virginia & Georgia, at Rader's Switch, Tenn., passenger train ran over a misplaced switch and into the head of a freight train, badly wrecking both engines. Three trainmen killed. The accident was caused by the freight crew neglecting to set up the switch.

27th, on New York, Pennsylvania & Ohio, near Gallon, O., butting collision between a fast freight train and a new engine out for trial on the main track without leave. Both locomotives and several cars were badly wrecked, injuring 4 trainmen and a boy riding on the new engine.

30th, on Norfolk & Western, near Blue Stone, Va., butting collision between a freight train and a work train, doing considerable damage.

CROSSING AND MISCELLANEOUS.

5th, on New York Central & Hudson River, in Rochester, N. Y., an east-bound freight train ran obliquely into a west-bound freight crossing the main track, disabling the locomotive and damaging 3 cars.

8th, at the crossing near Streator, Ill., an Indiana, Illinois & Iowa freight train ran into and overturned the caboose of a Chicago, Santa Fe & California construction train, killing a laborer and injuring 5 others.

8th, on New York, Lake Erie & Western, at Southport, N. Y., collision between two freight trains, one of which was backing on to a side track, doing some damage.

23d, on Lehigh Valley, at Packerton, Pa., a west-bound freight train ran into a construction train backing out of a siding, wrecking caboose and several cars, and injuring 3 laborers.

24th, a Central of New Jersey passenger train collided with a Lehigh Valley coal train at the crossing near Wilkes-Barre, Pa., damaging both engines and several cars. Two trainmen injured.

26th, on Cincinnati, Indianapolis, St. Louis & Chicago, at Sedamsville, O., freight train ran into a string of freight cars being switched across the main track, wrecking 6 of them and the switch engine. It is said that the accident was caused by a flagman's lantern going out just as he was swinging it to stop the incoming freight.

DERAILMENTS.

DEFECTS OF ROAD.

1st, on Union Pacific, near Echo, Utah, several cars of passenger train thrown from the track by a broken rail and overturned, injuring a passenger.

6th, on Baltimore & Ohio, near St. Louisville, O., a bridge gave way under a passing freight train and several cars went down into a creek and were wrecked. Two trainmen injured.

11th, on Shreveport & Houston, near Keithville, La., passenger train thrown from the track by the spreading of the rails, the rear car (a sleeper) going over an embankment. Three passengers injured.

12th, on Terre Haute & Indianapolis, near Vandalia, Ill., 3 cars of a freight train thrown from the track by a broken rail and wrecked.

14th, on Atlanta & West Point, in Atlanta, Ga., freight train thrown from the track by the spreading of the rails.

16th, on Montgomery & Florida, near Patsburg, Ala.,

freight train broke through a bridge, wrecking the engine and several cars. Engineer and fireman injured.

18th, on Columbus & Western, at Birmingham, Ala., yard engine thrown from the track by the spreading of the rails and overturned. Engineer hurt.

21st, on California Southern, at Box Springs, Cal., passenger train thrown from the track by the spreading of the rails, overturning engine, tender and baggage car. Engineer and fireman badly scalded.

26th, on St. Louis, Arkansas & Texas, near Garland City, Ark., freight train broke through a bridge, wrecking 7 cars.

DEFECTS OF EQUIPMENT.

6th, on Illinois Central, near Central City, Ill., 7 cars of a freight train derailed and wrecked by the breaking of a truck. A tramp stealing a ride injured.

7th, on Augusta, Gibson & Sandersville, near Narrel Station, Ga., 5 cars of a freight train derailed by a broken wheel.

10th, on Chicago, St. Paul, Minneapolis & Omaha, near Lake Elko, Minn., car in a freight train derailed by a broken wheel.

10th, on Pennsylvania road, in Philadelphia, Pa., 4 cars of a freight train derailed by the breaking of an axle, and wrecked. The cars, which were loaded with grain and oil, caught fire, presumably from the friction caused by the broken axle, and were destroyed.

11th, on New York, New Haven & Hartford, in Holyoke, Mass., journal under tender of engine in a passenger train broke, derailling several cars. Conductor hurt.

11th, on Delaware & Hudson Canal Co.'s road, near Harpersville, N. Y., 6 cars in a freight train derailed by a broken wheel and wrecked. A brakeman was caught in the wreck and killed.

11th, on Delaware & Hudson Canal Co.'s road, near Harpersville, N. Y., 6 cars of a freight train derailed and wrecked by the breaking of a wheel. A brakeman was caught in the wreck and killed.

14th, on Chesapeake & Ohio, near Kanawa Falls, W. Va., freight car derailed by a broken truck.

17th, on New York, Lake Erie & Western, at Hobokus, N. J., 17 cars of a coal train derailed and wrecked by the breaking of a wheel.

19th, on Chicago & Northwestern, near Elmwood, Mich., rear car of a passenger train was derailed by a broken truck and, overturning, dragged over some stumps near the track, completely tearing away one side of the car. Three passengers killed, 3 passengers and 1 trainman injured.

19th, on Lehigh Valley, at Pattenburg, N. J., 20 cars of a freight train derailed by the breaking of an axle and wrecked. A telegraph station building was struck by the derailed cars and demolished.

21st, on New York, Lake Erie & Western, near Corning, N. Y., several cars of a freight train derailed by the breaking of a journal.

22d, on Montana Central, near Butte, Mont., several cars of a freight train were derailed by the dropping of a brake-beam and badly wrecked, killing a trainman.

29th, on New York, Lake Erie & Western, near Deposit, N. Y., freight train derailed by a broken wheel.

29th, on New York, Lake Erie & Western, near Hale's Eddy, N. Y., car of freight train derailed by a broken truck.

NEGLIGENCE IN OPERATING.

2d, on Canada & St. Louis, near Colon, Mich., construction train derailed by a misplaced switch, killing a brakeman and injuring 6 laborers.

3d, on Baltimore & Ohio, near Washington, D. C., several cars of a passenger train were derailed at a point where track repairs were in progress.

6th, on Central Pacific, near Niles, Cal., caboose of freight train derailed and overturned by a large block of granite falling from a flat-car. Conductor and several passengers injured.

16th, on Atchison, Topeka & Santa Fe, in St. Joseph, Mo., rear car in a passenger train backing on to a side track derailed by a misplaced switch and overturned. Several passengers injured.

23d, on Fitchburg road, a string of 24 freight cars left on a side track at Ashburnham Junction, Mass., insecurely braked, started and ran down grade at high speed to Fitchburg, where they were derailed at a frog and partially wrecked.

29th, on Salt Lake & Fort Douglas, near Salt Lake City, Utah, a freight train descending a very steep grade became uncontrollable and ran at high speed to a curve, where it was derailed, killing two men riding on the train and injuring 2 trainmen. The rails were frosty and the sand-pipe on one side of the locomotive was clogged, so that the engineer could not sand the rails as effectively as usual.

UNFORESEEN OBSTRUCTIONS.

4th, night, on Boston & Lowell, near Pike's Station, N. H., 2 engines and 12 cars of a freight train were derailed by a boulder which had rolled down upon the line; 1 engineer was thrown out of the cab window and badly hurt.

9th, night, on Illinois Central, near Brookhaven, Miss., a south-bound passenger train running at speed struck a switch which had been purposely misplaced, derailling the engine and first 4 cars, including a coach, killing the fireman and injuring 2 other trainmen. The locomotive, after plowing its way some distance into an adjacent lumber yard, overturned and set fire to the lumber sheds, which, together with a planing mill and the derailed cars, were entirely destroyed. The contents of the burned cars were removed, and the underlaid portion of the train hauled away before the flames reached them.

9th, on New York Central & Hudson River, near South Troy, N. Y., passenger train ran into a landslide, wrecking the engine and derailling 5 cars. Engineer seriously and fireman slightly injured.

10th, on Toledo, St. Louis & Kansas City, near Delphos, O., passenger train ran into a tree, which had been blown down across the line, derailling the engine. Engineer and fireman hurt.

15th, on Little Rock & Fort Smith, near Ozark, Ark., freight train derailed and wrecked by a landslide. Engineer killed and several other trainmen injured.

17th, on Pittsburgh & Lake Erie, near Shousetown, Pa., freight train ran into a landslide, wrecking an engine and 5 cars.

20th, on Northern Pacific, near Spokane Falls, W. T., a car in a freight train was derailed by a tramp who had slipped and fallen between the cars just as the train approached a high wooden trestle. This structure gave way and 10 cars went down with it in a very bad wreck. The tramp was instantly killed.

26th, on Richmond & Danville, near Reidsville, N. C., freight train derailed and wrecked at a switch which had been tampered with by train wreckers, evidently with the intention of derailling a fast passenger train. The train, which was loaded chiefly with cotton, caught fire and was consumed.

28th, on Denver, Texas & Ft. Worth, near Clarendon, Tex., engine of passenger train derailed by sand which had drifted upon the track. Engineer killed, fireman fatally injured.

29th, on Fitchburg road, passenger train emerging from

the west portal of the Hoosac Tunnel struck one of the heavy doors used to close the entrance during the winter, dismantling one side of the locomotive and demolishing the cab, seriously injuring the engineer. The door was blown shut by a gust of wind just as the train approached.

UNEXPLAINED.

3d, on Gulf, Colorado & Santa Fe, near Overbrook, I. T., freight train derailed and wrecked, killing 100 head of cattle.

4th, night, on New London Northern, in Norwich, Conn., several cars of a switching freight train derailed, damaging turn-table and station building.

5th, on California Southern, near Los Angeles, Cal., passenger train derailed and baggage car and one coach overturned. One trainman and several passengers injured.

8th, on Cincinnati, Hamilton & Dayton, near Oxford, O., 4 cars of a freight train derailed and wrecked, demolishing an adjoining building.

9th, on Central of Georgia, at Bartow, Ga., passenger train derailed, wrecking the engine and baggage car.

9th, on New York Central & Hudson River, at Lyons, N. Y., switching locomotive ran off the end of a spur track.

9th, on Louisville & Nashville, near Rich Pond, Ky., locomotive derailed.

9th, on Louisville & Nashville, at Buford's, Tenn., a car of a freight train derailed.

10th, on Cincinnati, New Orleans & Texas Pacific, near Wilmore, Ky., freight train derailed and 15 cars wrecked.

10th, on Chicago & Northwestern, near Oak Creek, Wis., 15 cars of a freight train derailed and wrecked.

15th, on Covington & Macon, near Watkinsville, Ga., accommodation train derailed, injuring 3 trainmen.

15th, on Toledo, St. Louis & Kansas City, near Delphos, O., freight train derailed and several cars damaged, injuring two men riding on top of a car.

15th, on New York & New England, at Plainville, Conn., 9 cars of a freight train derailed.

15th, on Columbus & Western, near Opelika, Ala., freight train derailed.

17th, on Columbus & Western, in Birmingham, Ala., locomotive derailed and overturned.

17th, on New York, Lake Erie & Western, at Jamestown, N. Y., car in a freight train derailed.

18th, on Louisville & Nashville, at Alice, Ala., freight train derailed and partially wrecked. Two trainmen injured.

18th, on Bradford, Bordell & Kinzua, near Bradford, Pa., engine and baggage car of a passenger train derailed at a curve, the former being overturned in the ditch. Fireman slightly hurt.

20th, on Denver & Rio Grande, near Canon, Col., 3 loaded stock cars in a freight train were derailed and wrecked, killing 18 head of cattle.

21st, on Rome, Watertown & Ogdensburg, near Lewiston, N. Y., 10 cars of freight train derailed.

21st, on Rome, Watertown & Ogdensburg, at Lewiston, N. Y., 8 cars of freight train derailed, thrown over an embankment and badly wrecked.

22d, on Philadelphia & Reading, near Tamaqua, Pa., engine of passenger train derailed, overturned at right angles across the track and badly damaged. The runner, though pinned down under the locomotive, was only slightly injured. He escaped being scalded to death only by a strong wind, by which the steam emitted by the dismantled engine was blown in a direction away from him.

23d, on Central Vermont, near White River Junction, Vt., engine and 8 cars of a freight train were derailed and went over an embankment.

23d, on Pennsylvania, at Bradenville, Pa., freight train derailed and 13 cars wrecked.

23d, on Columbus & Western, near Alexander City, Ala., engine and several cars of a freight train derailed and wrecked.

26th, on Philadelphia, Wilmington & Baltimore, near Landith, Del., engine and 16 cars of a freight train derailed and wrecked.

26th, on Western & Atlantic, near Boston, Ga., freight train ran into a preceding freight, wrecking engine and several cars.

26th, on Chicago, Milwaukee & St. Paul, at St. Paul, Minn., engine and 3 cars of passenger train derailed, doing slight damage.

27th, on Chesapeake & Ohio, near Hawk's Nest, W. Va., car of freight train derailed and damaged.

28th, on Louisville, Evansville & St. Louis, near Lincoln, Ind., passenger train derailed. One coach was overturned, injuring 3 passengers.

28th, on Southern Pacific, near Luling, Tex., freight train derailed.

30th, on Central of Georgia, near Milledgeville, Ga., passenger train was derailed at a bridge and wrecked, injuring a trainman and several passengers.

OTHER ACCIDENTS.

1st, on Chicago, St. Paul, Minneapolis & Omaha, near Sioux City, Ia., engine and several cars on a freight train partly buried by a landslide while passing through a deep cut.

5th, on Cincinnati, Indianapolis, St. Louis & Chicago, near Columbus, Ind., locomotive of freight train exploded its boiler, fireman fatally and brakeman severely injured.

8th, on Chesapeake & Ohio, near Greenbrier, W. Va., truck under a car of a freight train broke down.

12th, on Manhattan Elevated, in New York City, spring hanger of passenger train broke at the sharp curve 57 ft. high near 110th street, letting the equalizer drop, and injuring the sleepers.

18th, on Missouri, Kansas & Texas, near Grandview, Tex., forward truck of engine of passenger train broke down. A brace dropped off upon the ground; it was caught by the front end of the fire-box, and was driven completely through both walls of it, letting water and steam into the fire-box, and throwing the hot coals into the cab. The fireman was thrown upon the ground, and was badly scalded.

14th, on Pennsylvania, near Allaire Station, N. J., water-pipes of locomotive standing in the yard blew out. Fireman was hurled out of the cab and badly injured.

30th, on Chicago, Burlington & Quincy, near Plano, Ill., boiler of engine of passenger train exploded, fatally injuring the fireman.

A summary will be found in another column.

Convention of the Electric Light Association.

The ninth convention of the Electric Light Association was held in Chicago, Feb. 19, 20 and 21. This meeting was the best attended and one of the most successful since the organization of the Association. The meetings were held in the Exposition Building, where ample rooms were provided. The assembly room was finely decorated with various colored incandescent lights. Among the guests of the Association were the Mayor of Albany and a committee from Boston Aldermen.

The convention was opened by the President, Professor

Duncan, and the address of welcome was given by John P. Barrett, Chicago City Electrician, in the absence of Mayor Roche. The address by the President gave some interesting facts in the development of the science of electric as commercially applied. The report of Mr. Allen V. Garratt was presented, which showed a balance of \$2,500 in the treasury. The committee on patent legislation and transportation rendered their reports; also the committee on underground conduits and conductors, and the executive committee.

The various reports were well discussed, and much information, particularly with reference to underground wires, was brought out. In connection with the convention there was a fine exhibition of electrical appliances in the Exposition building. Probably no other electrical exhibition ever given in the United States has been as well attended. The interest which the Chicago citizens displayed in the development of electricity is highly gratifying to local electricians.

The following gentlemen presented papers which were interesting and were well discussed by the members present: Mr. S. E. Barton, "Electric Light Stations as Fire Risks;" Mr. C. H. Rudd, "Disruptive Discharge in Light Cables." Accompanying this paper were several diagrams showing how such discharge takes place. Three other interesting papers on allied subjects were read by Mr. S. S. Leonard, Mr. M. J. Francisco and Mr. C. N. Ransom, the topics being "Fuel Oil," "Liquid Fuel" and "Advantage of Oil as Fuel" respectively. Mr. Alexander C. Chenoweth read a paper on "Conduits: Their Material in Relation to Insulated Conductors;" Fred H. Whipple, "Municipal Lighting;" A. R. Foote, "Municipal Ownership of Commercial Monopoles."

The following companies were among those who displayed exhibits in the hall of the Exposition building: The Chicago Rawhide Belting Co. had a full line of their excellent belting. This belt has been in use recently on many machines where continual shifting is required with good results.

The Stillwell & Bierce Manufacturing Co., Dayton, exhibited the Victor turbine. This turbine is peculiar in having a horizontal shaft adapted for driving dynamos. In application of water power to electric lighting this company has a large field before it.

Gould & Austin, western agent for the New York Belting & Packing Co., had a large exhibition of their belts and brass goods.

The Detroit Motor Co. had a large line of motors on exhibition. These motors ranged from the smallest size, suitable for sewing machines and lathes, about $\frac{1}{20}$ of a horse-power capacity, to those of 5 horse-power capacity. These motors were shown in operation.

The Shultz Belting Co. exhibited samples of a leather covered pulley, seamless and without rivets. The method of attachment is original, and the leather when in position is securely fastened and perfectly smooth.

The Waters-Sweeney telegraph and telephone switch was a very original device, and many testimonials from purchasers were shown.

The Excelsior Electric Co. exhibited small and large motors and dynamos, with double and single arc lamps, also focusing headlights and locomotive headlights.

The Pumpelly Co., Chicago, showed a fine line of storage batteries. The claim for these batteries is greater compactness, less internal resistance and increased durability.

The Central Electric Co., of Chicago, and the Okonite Co., of New York, made a joint display of wires, cables, tapes and tubing, and a full supply of electric construction tools.

The Non-Magnetic Watch Co., of America, had a fine display of non-magnetic watches, fitted with the Paillard balance.

The Ashton Valve Co., Boston, exhibited their "pop" safety valve for stationary and locomotive boilers, also valves for pumps and stand pipes.

John Roebling's Sons Co., Trenton, N. J., had a very fine exhibit, consisting of various sizes of wires, among which was a two-mile roll of copper wire intended for overhead electric railway systems.

The exhibit of James W. Queen & Co., Philadelphia, showed a rare collection of testing instruments, and was probably the most extensive exhibit of the kind ever shown in this country. In this exhibit was shown the Thomson balance, invented by Sir William Thomson, of England.

The Thomson-Houston Co. exhibited a street railroad car in operation, running with the overhead system. This car was the centre of attraction to a large number of people. It was constantly crowded, and seemed to work without interruption.

The Standard Underground Cable Co. exhibited a line of their cables.

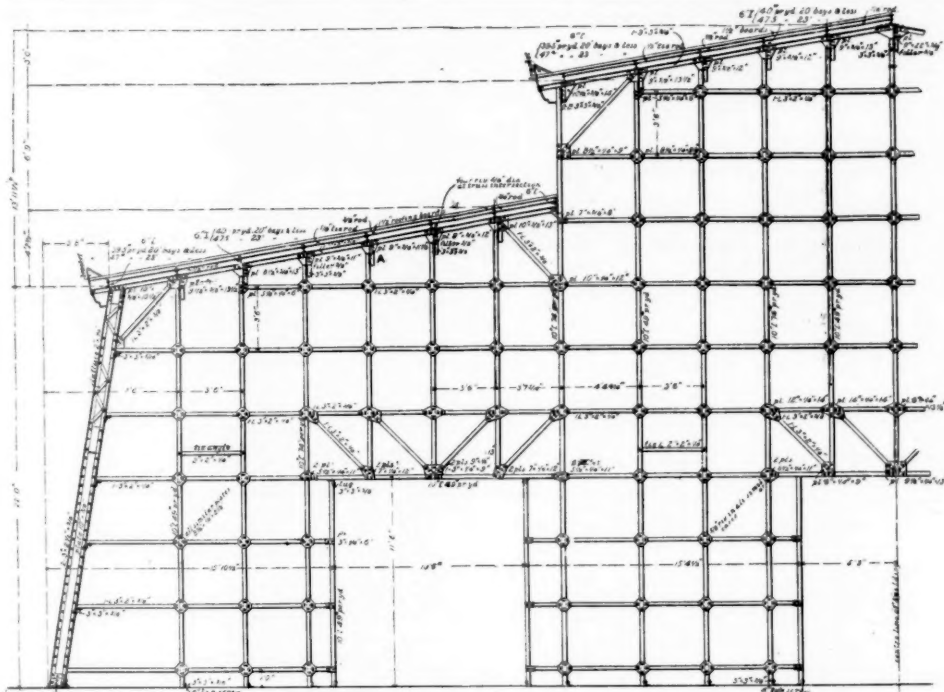
The Giles non-magnetic shield, which is adapted to fit any watch, whatever its design, without alteration of the works, was shown in position and operation.

Among the many other exhibits were the phonograph, the electric welding process, many different manufactures of dynamos and motors, non-conductive covering for steam pipes, various designs of friction and positive clutches, coal mining drills operated by electricity, the largest watch in the world, exhibited by the Waltham Mfg. Co., Waltham, Mass.; the dial was 3 ft. in diameter and records time to 1-50 of a second. It is operated by electricity.

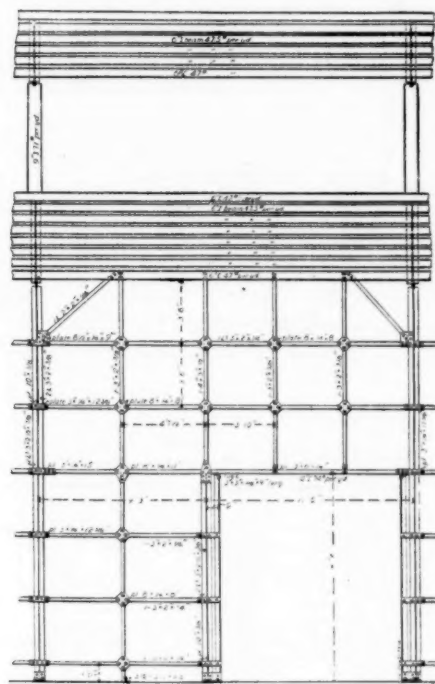
Iron Freight Shed of New York Central & Hudson River Railroad.

The illustration herewith shows a freight shed built on Pier No. 62, Hudson River, for the river freight business of the New York Central & Hudson River Railroad.

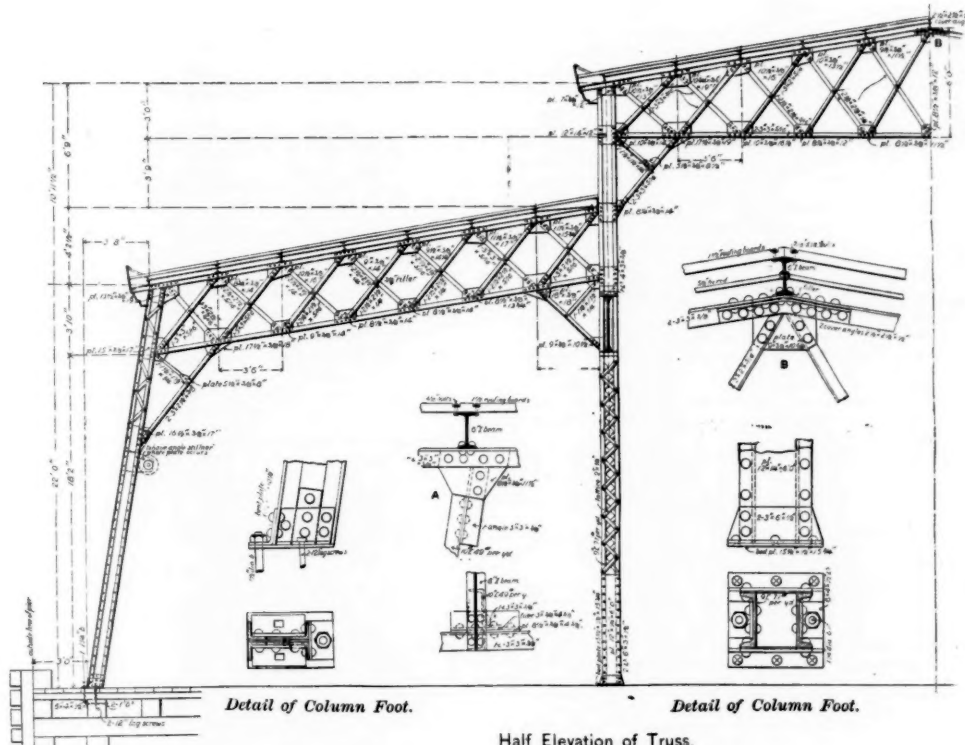
The shed is constructed almost wholly of iron, and calculated to stand a hurricane. It is 493 ft. long, and is 94 ft.



Half Elevation of West End.



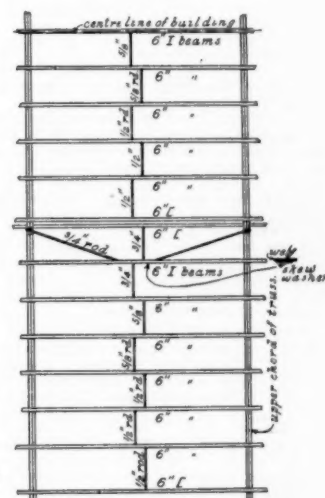
Elevation of a Bay with Door on Side of Shed.



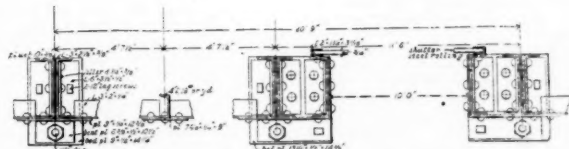
Detail of Column Foot.

Detail of Column Foot.

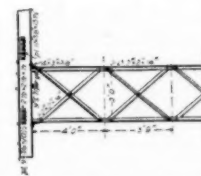
Half Elevation of Truss.



Plan of Tying I Beams and Channel Throughout.



Plan of Frame of Bay with Door.



Elevation of Girder in 20-ft. Bay.

IRON FREIGHT SHED OF THE NEW YORK CENTRAL & HUDSON RIVER RAILROAD.
NEW PIER 62, NORTH RIVER, FOOT OF WEST THIRTY-SECOND STREET, NEW YORK CITY.

wide. The height is 36 ft. in the centre and 22 ft. at the sides, as shown in the drawings. The roof is constructed with 6-in. I beams and channels, as shown, and the following table, gives the weights used in bays of various lengths:

For 23 ft. bay 6 in. I beams, 47.5 lbs., and 6 in. channels 47 lbs. per yard.

For 21 ft. bay 6 in. I beams, 47.5 lbs., and 6 in. channels, 47 lbs. per yard.

For 20 ft. bay 6 in. I beams, 47.5 lbs., and 6 in. channels, 47 lbs. per yard.

For 20 ft. bay 6 in. I beams, 40 lbs., and 6 in. channels, 39.5 lbs. per yard.

For 19 ft. 3 in. bay 6 in. I beams, 40 lbs., and 6 in. channels, 39.5 lbs. per yard.

For 15 ft. bay 6 in. I beams, 40 lbs., and 6 in. channels, 39.5 lbs. per yard.

For 10 ft. 6 in. bay 6 in. I beams, 40 lbs., and 6 in. channels, 39.5 lbs. per yard.

The covering of the roof is spruce boarding and Warren's

gravel roofing. The front and sides are covered with corrugated iron.

There is a single railroad track through the centre of the building, and the freight is transferred on to boats at the sides of the pier through 7 doors on each side, which are closed with Wilson's steel rolling shutters. It is noted also that all the doors extend to the floor line of the ramp and not to floor line of the dock.

The panel-spacing of the shed is the same throughout vertically, as shown in the elevation, but the horizontal spacing varies as follows in the different sized bays:

23 ft. bays have 5 panels—3 panels 4 ft. 7 in. each and 2 panels 4 ft. 7½ in. each.

21 ft. bays have 4 panels, 5 ft. 3 in. each.

20 ft. 9 in. bays have 4 panels—2 panels 5 ft. 2 in. each and 2 panels 5 ft. 2½ in. each.

20 ft. bays have 4 panels, 5 ft. each c. to c.

19 ft. 3 in. bays have 4 panels, 4 ft. 9½ in. each c. to c.

15 ft. bays have 3 panels, 5 ft. each c. to c.

10 ft. 3 in. bays have 2 panels, 5 ft. 3 in. each c. to c.

The pier is built of yellow pine piles and timber, and the entire length of the shed is on the pier.

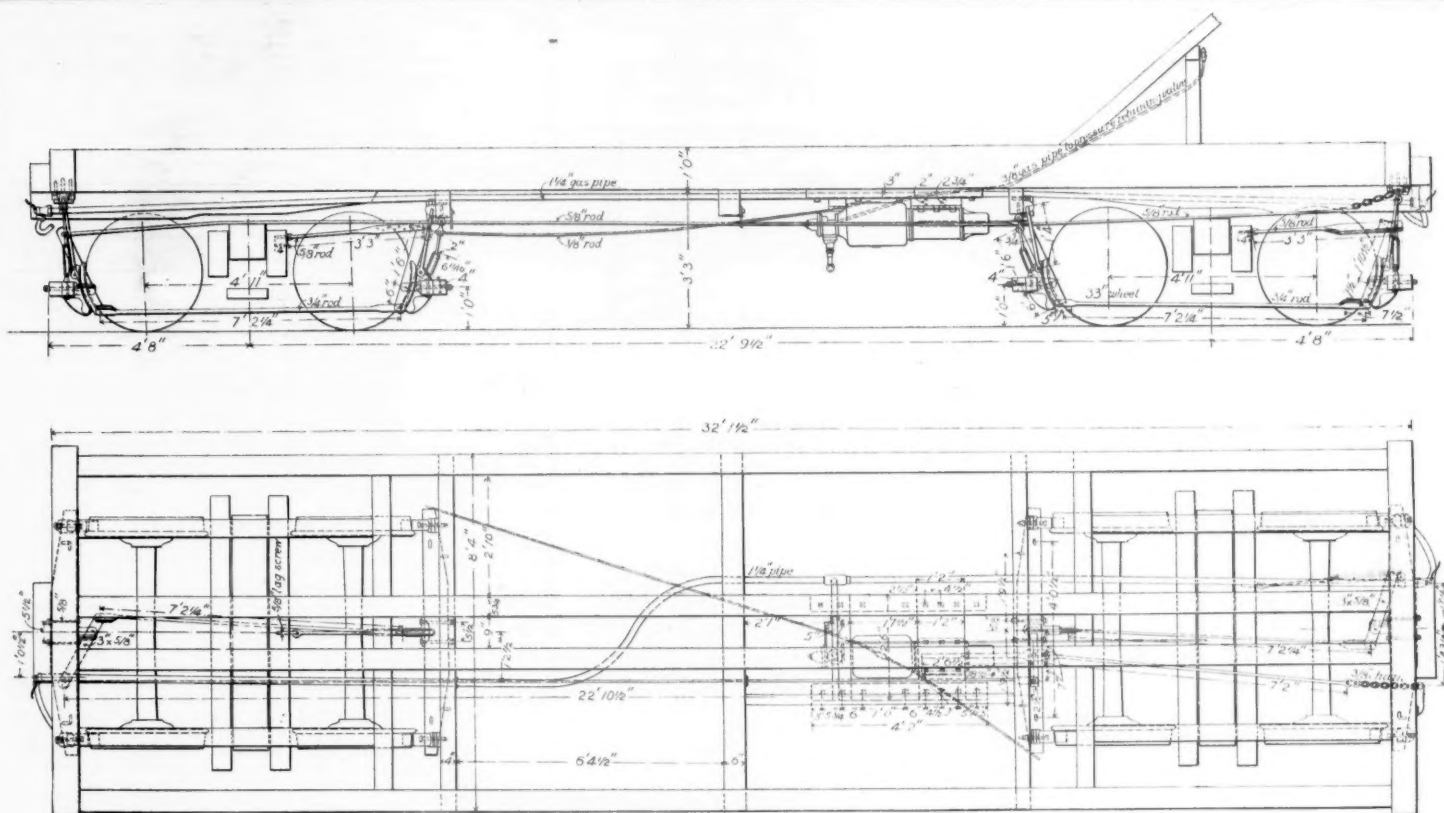
The iron work was made by the Pennsylvania Construction Co. of Pittsburgh, and designed by Mr. Walter Katté, Chief Engineer, and Mr. G. H. Thomson, Bridge Engineer New York Central & Hudson River.

Locomotive Tender Trucks.

The paper by Mr. John Hickey, Master Mechanic Milwaukee, Lake Shore & Western, on "Tender Trucks for Locomotives," read before the Western Railway Club, was printed in our last issue. An abstract of the discussion follows:

Mr. D. L. BARNES: What is your objection, Mr. Hickey, to swing motion trucks?

Mr. HICKEY: In the first place it is difficult to retain a tender resting on a centre bearing solely with a swing bolster. It usually gets down on the side bearing and interferes with its curving freely. And again, the bolster is more



AIR BRAKE ARRANGEMENT FOR SIDE CHUTE HOPPER CAR.

expensive to construct and far more expensive to keep in repair.

Mr. RHODES: Do I understand that you have side bearings on both the forward and the back truck of the truck?

Mr. HICKEY: Yes, with plenty of space between, so they won't interfere, except during the rolling of the tender.

Mr. BARNES: Have you had any difficulty where the side bearings, upper and lower, were in direct contact, either on tenders or on cars?

MR. HICKEY: Yes. We have had the greatest difficulty when cars lay heavily on the side bearings. They curved badly and such bearing caused hot boxes. There should be a space between the side bearings. To my mind that is very important in rounding curves.

Mr. BARNES: I believe you have in use some eight-wheel tenders with side springs, front and back, the springs being very long, about 42 in., and the back truck has centre bearings made with springs of about the same size. Have you had the same difficulty where the side bearings are springs as you have had when they are solid blocks, above and below?

Mr. HICKEY: Some of our tenders have springs on the back end of the tender, resting on the truck, without the aid of equalizers, and the front end of the tender resting on two springs near the center. But they don't work well, and for that reason we are about to advocate a change in the direction of having n-thing but central bearing trucks and the back and front interchangeable.

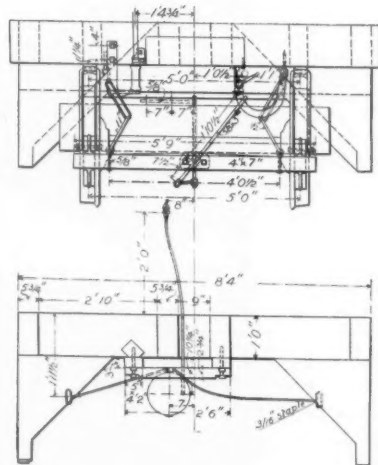
President RUCDES. The point Mr. Barnes and Mr. Hickey have been referring to is an interesting one on account of the different practices on different railroads. On our road it used to be the practice to have side bearings only on the rear trucks of the tanks. The forward trucks didn't have side bearings. When we increased the capacity of our tanks to the dimensions that Mr. Hickey mentions, we didn't think it was wise to carry on the forward truck all the surging of the tank, and we thought it would assist matters if we put side bearings on the forward trucks. We did so, and one of the tanks was sent out on a division, and the next thing we knew that tank was derailed. The men on the road, not being accustomed to tanks set up in that way, neglected to watch the truck and they let the forward part of the truck come down too heavily on the side bearings. The result was the same trouble that we frequently have with freight cars when they come down on their side bearings. The master mechanics of those divisions wished to do away with the forward side bearings, but the ruling in the matter was that the bearings should be kept off, and then there would be no danger of derailling. The question of rigid trucks and swing-beam trucks is interesting. Many lines advocate the rigid truck. In the West I think generally the swing-beam is used; I believe in the East the rigid truck is more general. From what little investigation I have made in the matter, I have not been able to see much advantage in one over the other. Mr. Hickey states that the rigid truck is more economical. I should like to know wherein.

Mr. HICKEY: I have not the figures at hand to show that the rigid truck is more economical than the swing beam, but this I know, that we have had more trouble with the swing bolsters on cars than we have had with the rigid bolster. One of the reasons is that we have four hangers and four cross bars, and we have been put to greater expense in repairs, owing to the number of joints. The hangers have worn out; the pins have bent and the castings on which they rest have broken; the result has been that they have been more expensive than the other. We have been able to do away with most of those in the rigid bolster, and consequently we found it was not only more economical in construction, but more economical in repairs, as it reduces the number of joints.

Mr. MIDDLETON: We find it is a good deal more trouble to keep up the swing motion trucks than the rigid trucks. We use the rigid trucks under everything except passenger cars.

President RODES: I can recollect some years ago, when we used to think that a freight truck was good enough for a tank truck, and we used to advocate it and try to use it. I rather gathered from Mr. Hickey that the car trucks were getting better than the tank trucks, and if anybody present is ready to advocate a freight car truck for a tank truck I would like to have some reasons for it. I used to advocate it at one time, but I don't now.

Mr. COOKE: I think a swing motion truck works very



well until you get above 20 tons, but after you go beyond that I don't think a swing motion truck is economical.

But I don't think a swing motion truck is economical. R. R. Rusk, Chief A. Mr. Heigh says, "Our engines and tanks have been increasing in weight and the requirements from them. With increase of duties demanded from the engine, increased duties have been required on the part of the engineer and firemen, who handle the engine. With our small engines it used to be customary for the firemen to ride mostly on the engine, and engines usually ride well. The heavy engines that we are now building require the fireman to ride more on the tender in order to fire successfully; and, to avoid complaints from engineers and firemen, I think it is very important that master mechanics should facilitate the work of the engineer on the engine and reduce the work of the fireman on the tender. If we will do that we will find that the objections to running these heavy engines will disappear to a great extent. To illustrate this: balance valves are introduced so that there is less work for the engineer reversing his engine; in some cases steam throttles are introduced, also improved oilers are put in the cab to save labor, and in the matter of grates we find improved methods for skaking the fire and cleaning ash pan. Now, that we are studying economy in fuel, it is more and more important that the fireman attends to his duty in a proper manner, and he can do so only by being constantly at his place of duty, which is near the fire door. We have found, where we have neglected our duty in the matter of tenders, especially by using freight trucks under them, that the fireman constantly desire to ride on the engines; they complain of the heavier work that the heavier engine imposes upon them. Give the fireman a better tender to ride upon and it will lessen his work materially. The constant jolt and shake will not wear him out so quickly. We are now aiming to put a good truck under our tenders in order to obtain the best work from the fireman. We are using just as good trucks under tenders as we put under passenger cars. Although some years ago I used to urge the use of the freight truck under tenders, I have entirely changed my opinion. I don't want anything of that kind. I want a truck that will ride very much better than any truck."

Mr. MIDDLETON: Mr. Rhodes has given my experience precisely. I have not only made it easier for our passenger firemen, but also for our freight firemen. We make an easy riding truck for tenders.

Mr. SETCHEL said the point aimed at seems to be to get an easier riding truck. Now, is it not best to get an easier riding freight truck? If so, what is the reason that it is not a good plan to employ the same form of a truck, but with a very much better spring. Then if you are out on the road and meet with an accident, you can jack up the first car and take out the truck and go right on with your train instead of being delayed. It seems to me that if it is all on account of

the springs we should improve our springs. It would not be a bad thing to have an easy riding freight car. It is not absolutely necessary, freight being unconscious, and not like a fireman who can complain, but sometimes we have freight bills to pay from damaged freight riding over some of our rough tracks.

Mr. CLEAVER: We are using a truck very little different from a freight truck, but we use an elliptic spring. We at first used a full elliptic spring, but we have now changed, and are using the half elliptic, and we find it works very nicely on the trucks. The only thing to look out for is to keep the tender off of the side bearings.

The PRESIDENT: Do you use side bearings both front and back?

CLEAVAR: Yes; both front and back. The tender is over on one side the other side will be about half an inch clear. We use a wooden spring plank, and find it necessary to truss it considerably, because, for some reason or other, it gives out quicker than it does under freight cars. I think it would make a much better truck if we put in an iron channel bar there for a spring plank. We use an inch and a half turnbuckle, and the arch bars are an inch and an eighth by four.

Mr. RAYNOLDS: We have the same trucks under tenders as under our 60,000-lb cars, with the exception of the wheelguards and springs. We put in full elliptic springs under tenders instead of spirals.

Mr. CLEVELAND: There is another point that has quite a bearing on the tender truck question, and that is, the possibility of raising and lowering the truck. It is very necessary to keep the tender level with the deck of the locomotive, and with a good many trucks this is a difficult matter to do. Take an engine starting out with a 3½ or 4 in. tire, and work it down to 1½ or 1½ in.; there is quite a difference in the height. There are many trucks that won't accommodate such a difference, and we are obliged to run them a trifle higher than the engine, which is not a very good feature.

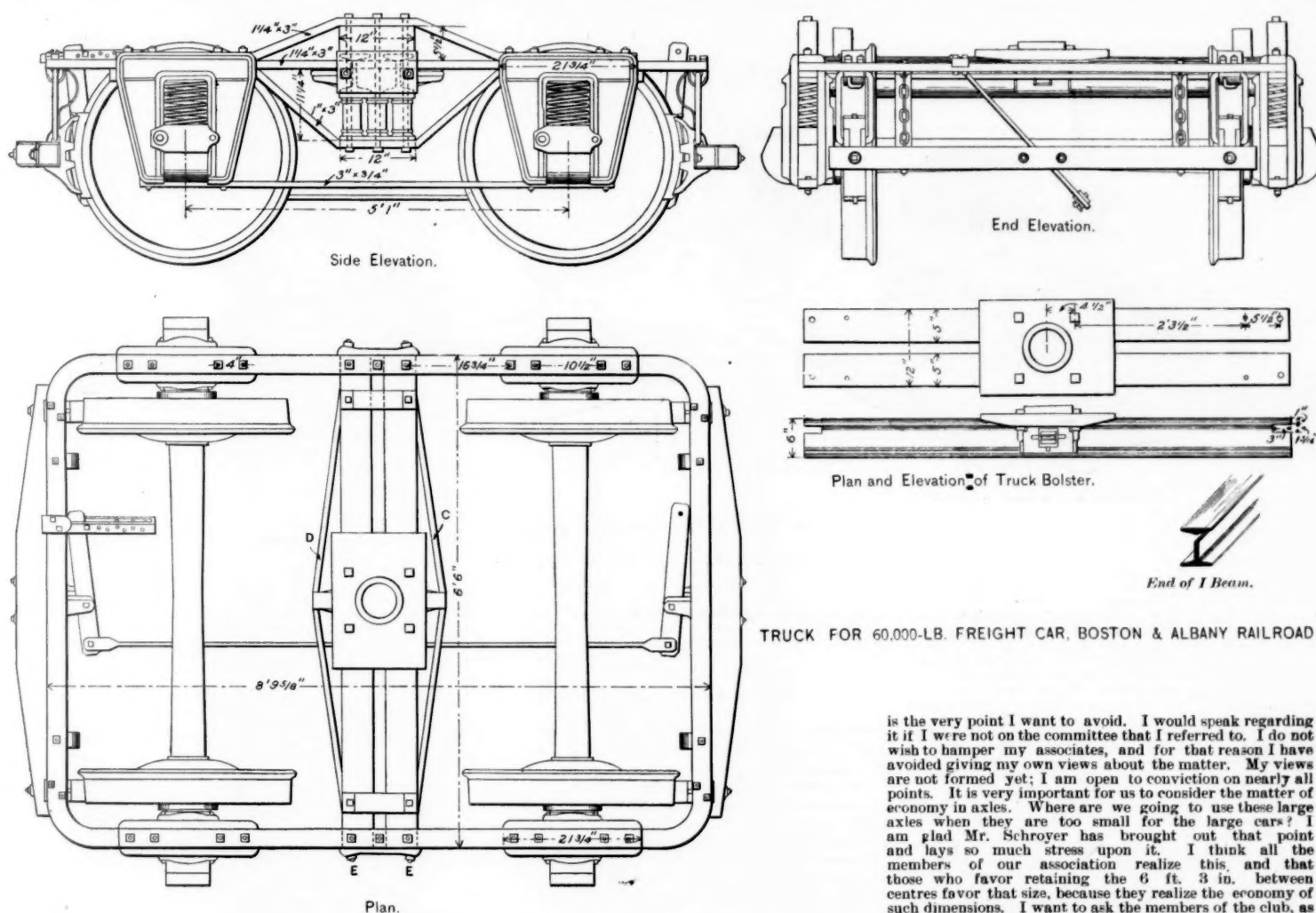
Mr. HUGHES (Northwestern of India) : With the severe running we have on our road in India we could not keep them off the bearings, so we put chilled cast-iron running pieces, as we call them, side bearings you call them, and they work well; we use a little oil for lubrication. We have no derailments from them. We have a piece of mountain road there with curves of 450 ft. radius, a very rough road, and we have no trouble with them. They work well around the curves and wear well. We started in keeping them about $\frac{3}{8}$ in. clear, but we very seldom found them clear after they were out on the road. They were swing trucks. We have no rigid trucks. They are all arranged according to the English patterns. We have $\frac{3}{4}$ in. side play, and they are allowed $\frac{3}{8}$ in. side play on the brasses, the journals being 5 in. by 8 in. We carry 9 tons of coal and 3,000 gallons of water.

Mr. A. FORSYTH: There has been a good deal said about using a freight car truck under the tender. Why don't you talk about using a freight car truck under a passenger car. There is just as much difference. It is a movable load in the tender, and it has the hardest service that a truck could be put to. It naturally requires a very strong, substantial heavy truck, and it must ride easily.

Mr. SETCHELL: I think I must take exception to what Mr. Forsythe has said. The freight is precisely the same that we carry on our freight cars. The bulk of it is coal, with water, and so far as the vibration of the tank is concerned, the easier the riding, the greater the motion of the water, the greater the vibration. Now I have known springs to be put under an engine that were so light and vibrated so easily that the engineer was afraid to ride on the engine and requested a heavier spring, so that the engine wouldn't jump so. I cannot see that there is any difference at all between the freight carried on a tender and the freight carried on a car, but there is a very great difference between freight and passengers. It seems to me they bear no similarity at all.

Arrangement of the Air Brake on a Hopper Car.

The illustration herewith shows a peculiar application of the air brake. The air brake applied to gondola and hopper cars is not often seen, and the one illustrated is interesting, as it gives pretty full details of the brake to a peculiar side chute hopper car in use on the Union Pacific. The location of the details and the dimensions, as well as the positions of



TRUCK FOR 60,000-LB. FREIGHT CAR, BOSTON & ALBANY RAILROAD.

all the parts are so well shown in the illustration as to need no further description.

To properly arrange a satisfactory brake rigging upon a hopper car is a problem beset with difficulties. The arrangement shown herewith has given good satisfaction on the Union Pacific.

Truck for 60,000-Lb. Freight Cars—Boston & Albany Railroad.

The freight car truck shown in the accompanying illustration is one built at the Alston Car Shops of the Boston & Albany, under the supervision of Mr. F. D. Adams, General Master Car-Builder.

This truck is an improvement on previous special trucks built by that company for 100 coal cars which have been in service one year under average loads of 60,000 lbs. to each car. The first design was a trifle weak on the side trusses, and this design has been made to take the place of the first, when those need repairs. Three pairs of trucks have been built from this second design and have been running for some months under special heavy cars. This is the truck mentioned at a recent discussion of the New England Railroad Club.

The axle is $5\frac{1}{4}$ in. dia. in the wheel seat, $4\frac{3}{4}$ in. dia. at the center and $4\frac{1}{2}$ in. dia. at the journal. It is made the same length over all as the Master Car Builders' axle, and will go into the same journal box.

This is essentially an iron truck with floating boxes. The bolster is rigid, and formed of two 6-inch I beams. These transoms are cut out, as shown in the elevation and the perspective view, to fit over the side frame. At C and D are shown truss rods having nuts to take up the slack. The purpose of these truss rods is to stiffen the I beams laterally against the strains longitudinally of the car when the brakes are applied to the wheels. This arrangement of I beams for a truck transom is quite new and original.

Axles for 60,000-lb. Cars.

Mr. G. W. Rhodes' paper on this subject, read before the Western Railway Club, was printed in our last issue. An abstract of the discussion follows:

Mr. SCHROYER: I consider it a matter of the greatest importance from an economical standpoint that the distance of 6 ft. 3 in. from centre to centre of journal be retained, so that we may be enabled to use the 60,000 lb. car axle under cars that are now in service. There is one point that, perhaps, may be objectionable, regarding the use of the 8 in. journal; that is, when it is put under the old cars. This point is the small space from the dust-guard to the shoulder; it may result in causing the dust-guard to catch on the shoulder of the journal on account of the lateral movement of the axle. If we are going to use this 8 in. journal universally we must make the dust-guard socket plate a little thinner, and move it in towards the wheel a little. We have now, in our service, $5\frac{1}{2}$, 6 and 7 in. journals. We could not take a 7 in. journal and put it in where a 6 in. journal is now used, because there is a difference between the centres. The result is that we have to throw away numbers of axles if we adopt a journal that is going to increase the length between centres. We will encounter the difficulty here-

after that we are now encountering with the 6 in. and 7 in. journal. I consider it a matter of the greatest importance that this distance between centres be retained, and that we do not increase the diameters sufficient to prevent us retaining the distance between the bolt holes that we now use in the M. C. B. standard axle-box, in order that the same arch bars may be used. If we increase the diameter too much we shall be compelled to increase the distance between the bolt holes. Those are the vital points which I think should be considered in the adoption of the journal. I would say, regarding the increase of the length of the box, by extending it back further towards the hub of the wheel, that many builders are constructing them in that manner, with the special object in view of having the back end of the box take the thrust.

Mr. MIDDLETON (Louisville & Nashville): Mr. Chairman, this is a matter that we have investigated very thoroughly on our road. We have adopted the 60,000-lb. capacity for all cars that we are now making. While designing our axle for this car our great object was to use our old centres of journals, and our old journals if necessary. We retain the same dimensions between the bolt holes in the oil-box. The adoption of cars having greater carrying capacity necessarily makes the dead weight greater, and we should endeavor to reduce it all that is possible. The axle that we are using weighs about 435 lbs. Several years ago we had considerable trouble in our passenger service with hot boxes. Since we put in 4×8 journals a hot box is of rare occurrence, instead of being, as it once was, a common affair. We have got to put in an axle which we can use, after it is worn down below the limit of diameter, in our 40,000 lb. cars.

The CHAIRMAN: What is the minimum diameter you are to allow before removing them from 60,000 lb. cars?

Mr. MIDDLETON: We have adopted the Master Car Builders' sizes; and in that respect we adopt the M. C. B. rules. I will state that we have from 2,500 to 3,000 of the large axles under our freight cars, and under all our passenger cars.

The CHAIRMAN: Is it your idea to introduce them under cars of lighter capacity when you have done with them under the 60,000-lb. cars?

Mr. MIDDLETON: Yes, we put in a brass about 6 in. long, and make it $3\frac{3}{4}$ in. or $3\frac{1}{2}$ in. diameter, as may be necessary, instead of 4 in. The greater length of the journal is an advantage rather than an objection.

Mr. SNOW: Mr. Chairman, our axles are 6 ft. 3 in. from centre to centre of journal, and we find plenty of room there to put in a 7-in. journal. We don't have much trouble with hot-boxes. We are using a 4×7 journal under 40,000-lb. cars, and we very frequently get 60,000 lbs. and sometimes more into those cars, but we have very little trouble with them. I think I should prefer a journal about $4\frac{1}{2} \times 8$; I don't know but I would suggest even little larger dimensions than those. Let us have a journal so large that when we need an 80,000-lb. car we will have an axle strong and large enough to carry the load.

Mr. VERBRYCK: If I were going to make a radical change or vote on an axle I should be in favor of at least $4\frac{1}{2} \times 8$ in. journal. When I first came to the Rock Island road we used to have a great many hot boxes. They were using a journal $3\frac{3}{4} \times 3\frac{3}{4}$, and the trouble from hot boxes was almost continuous. I changed the dimension before the M. C. B. standard box and axle were made, and increased the size to $3\frac{3}{4} \times 7$, and it was a success. I think that a $4\frac{1}{2} \times 8$ in. journal, for a 60,000 lb. car, would be about right, and then, if we wanted to increase to 70,000 or 80,000 lb. cars we would have an axle that would carry such loads.

Mr. SCHROYER: I would like to ask Mr. Rhodes if he has any sizes to suggest for that axle. I am very anxious to do something that will harmonize with the action of the Master Mechanics' Association, as we all feel the importance of moving in that way.

Mr. RHODES: As to suggestions on size of diameters, that

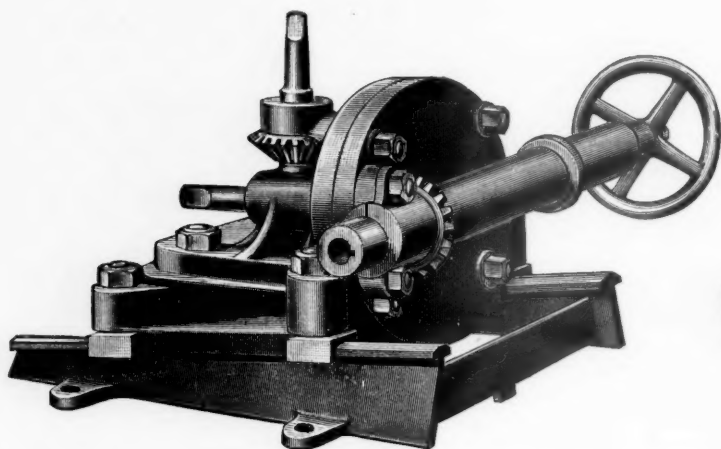
is the very point I want to avoid. I would speak regarding it if I were not on the committee that I referred to. I do not wish to hamper my associates, and for that reason I have avoided giving my own views about the matter. My views are not formed yet; I am open to conviction on nearly all points. It is very important for us to consider the matter of economy in axles. Where are we going to use these large axles when they are too small for the large cars? I am glad Mr. Schroyer has brought out that point and lays so much stress upon it. I think all the members of our association realize this, and that those who favor retaining the 6 ft. 3 in. between centres favor that size, because they realize the economy of such dimensions. I want to ask the members of the club, as well as other master car-builders who may read our discussion, to answer the committee's circular on axles. We have sent out a circular asking certain questions which will give us a good deal of information if we receive answers from all the members, and it will aid the committee very materially in crystallizing their ideas into a recommendation to the convention to act upon this year. It is simply facts that we want, and if all the members will take up that circular in the spirit in which it issued it will materially ease the labors of the committee, and I think the committee is deserving of that attention. Some years ago, when the question of the adoption of a standard axle came up between the Master Mechanics' Association and the Car-Builders' Association, it was found by the Master Mechanics' that their committee readily agreed to the longitudinal dimensions, but that they failed to agree on the diameters. The discussion on the axle question now among the car-builders' seems to have reversed those conditions, and there are two sections in the Car-Builders' Club who are about ready to agree on diameters, but they are at cross purposes on the longitudinal dimensions.

Mr. WILDER (United States Rolling Stock Co.): I have considered the matter of sizes of axle, not only for 60,000-lb. cars, but also for our standard cars. There is one argument which has not been touched upon here. It is in regard to maintaining the same centres of journal bearings as the Master Car-Builders' standard, and that is of there is room enough to get in the long journal and use the box in that way, it is very desirable not to lengthen your journal, because the further you extend the centre of your journal bearings, the greater will be the leverage of the weight on the journal to break or bend the axle, and, consequently, the greater strength you must have in the centre of your axle to maintain it. The closer you can keep your journals together the less will be the strain upon the centre of your axle.

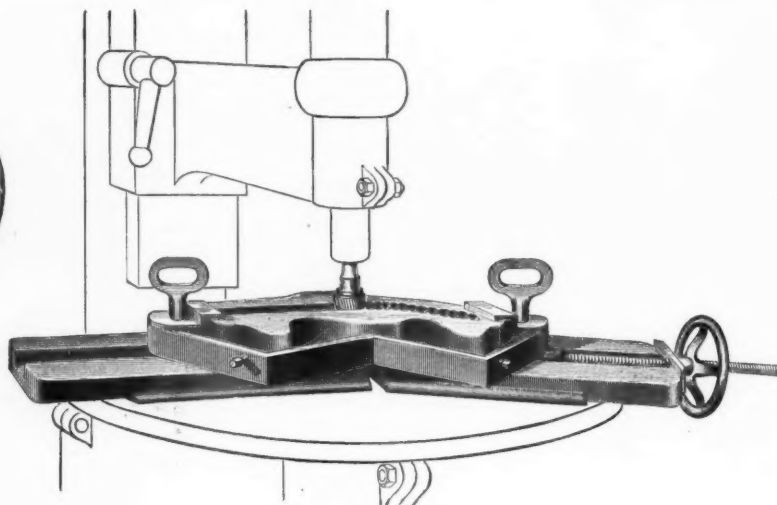
Mr. SETCHELL: We desire to have our trucks, boxes and arch bars so constructed that we can change the axles from one car to another. So far as freight service is concerned there will not be a great deal of that done. I have always made a practice of using axles from passenger cars, after a certain length of time, in freight service, and I think it is very well to have the equipment arranged so that this can be done. In the freight service you will rarely find master car-builders changing axles to cars of less capacity, unless in the case of very poor cars. As Mr. Rhodes has suggested, why not add another axle to our freight equipment? That will keep the boxes and axles uniform. It will add another axle and another pair of boxes and increase somewhat the cost of the truck, but if we are doubling our carrying capacity, can we not afford to do that? Will not our arch bars wear longer, and will not our wheels wear longer, and will there not be a greater degree of safety than with the four-wheeled truck? Then we could use our axles of uniform sizes, and there would be no trouble about changing boxes or anything else, and no mistake about the capacity of the car.

Mr. VERBRYCK: Regarding six-wheeled trucks, I don't think we shall ever reach that in freight service, on account of the difficulty of putting in wheels. I have come to the conclusion that a four-wheeled truck can be used very successfully with a 60,000-lb. car, and I am of opinion that 60,000 lbs. is as much as any one car ought to carry.

Mr. RHODES: I wish to refer to one of the positions which Mr. Setchell has taken regarding the transfer of axles, when too small, from one service into another. In freight equipment such transfer is made daily. At the last Master Car Builders' convention a resolution was passed limiting the size of wheel fit, if I recollect correctly, to $4\frac{3}{4}$; no axles were to be refitted under freight cars that had a less diameter of wheel fit than $4\frac{3}{4}$ in. Now, at this date, there are thousands of cars running with axles less than $4\frac{3}{4}$ in. the wheel fit, and running safely. I was asked the other day by one of our master mechanics how we should act in cases of this kind. Should they be condemned? It seems to me that the question of economy arises at once. It will be an economical step for us if we design the new axle, so



Horizontal and Radial Drilling Machine.



Link Miller and Slotter.

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that we can use it in a 60,000 pound car, and, when it is too small for that car, under a 50,000-lb. car, and so on down. I know of one road with 30,000 or 40,000 cars now in service, under which the axles have wheel fits, probably, no larger than $\frac{1}{4}$ in. dia., and they are running safely, and it is not economy to scrap them. Those are not cars of 28,000 and 30,000 pounds capacity, but cars of 40,000 lbs. capacity.

The CHAIRMAN: Do you not imagine the revolutions have something to do with the carrying capacity of the axle?

Mr. RHODES: On that question I know that many persons hold different views. I think the reason is not because we have used large axles and that they have crystallized, but then we have used too small axles. We have used them until they have become strained and broken, and that has given us the idea that axles after a certain service crystallize and are no longer safe. I remember very well, on a certain railroad, that the axles in the passenger equipment, steel axles, were limited to 50,000 miles, and after that they were condemned. The diameter of those journals was $3\frac{3}{4} \times 7$ to commence with. The other proportions of the axle were very similar. Now it seems to me very plain that that axle was too small to begin with, and that by being constantly strained beyond its elastic limit, after being some eight or nine months or a year in service, it would break. Later on the axle was increased in diameter, and the result was that the limit was raised to 100,000 miles. Still later on the diameter was increased again, and the result was that no mileage limit placed on the axles. I think the reason many of us have the idea of axles failing, after a certain mileage, is because we have used too small axles. They have constantly been strained beyond their elastic limit, and the result is an eventual failure and breakage. Now that we are proposing axles of dimensions that will not be strained beyond their elastic limit. I, for one, do not feel any fear in the matter of crystallization, for the reason I have just given, which is our past experience.

Mr. HUGHES (Locomotive and Car Superintendent Northwestern of Ind.): For many years past we have been taking axles from our heavier wagons and working them under the lighter ones. We are using entirely steel axles. When I commenced on our road about 15 years ago the journals were $3\frac{3}{4}$ by 8; I am now running $4\frac{1}{4}$ by 8 and find them most successful.

Mr. SCHROYER: Mr. Rhodes in his paper lays considerable stress, and justly so, on the side thrust being taken by the brass, which you all know to be the fact. Some years ago we got up a box with the especial object of having the end of the box take the thrust from the face of the hub, for the reason that we wanted to run a blind wheel for a center wheel in a six-wheel truck. The result is we have no side thrust on the axle collars, and we find that there is enough lubrication to keep the hubs of the wheels lubricated at all times. In new boxes, constructed for a 60,000 lb. car, this box at the back can be carried back another half an inch further which will give you just as much play at that point as we now have. The box is abundantly heavy at the sides to take up the side thrust, simply because it is the side plates of the box that come directly in contact with the face of the hub of the wheel. I believe that the only objection that can be offered to the 6 ft. 3 in. centre in the construction of the journal box at the inner end. Mr. Snow tells us that he is now running them 6 ft. 2 in. from centre to centre. If that size of journal, under the conditions he mentions can be successfully run, then it is precisely what we are aiming for with the 8 in. journal.

Mr. VERBRYCK: That is exactly the way I have been doing for the last eight years. I allow only a quarter of an inch play between box and hub, and have had good success. The back of the box will wear away in time, but I find it wears very slowly. We allow the box to be placed close up to the hub of the wheel.

Mr. MIDDLETON: We do likewise, and we are meeting with good success.

Mr. SNOW: All the cars that we have built since 1880 have been built with the box up against the hub of the wheel, and we don't allow more than an eighth of an inch clearance. But they will wear off. I have seen them with at least half an inch on each side. I put up one car with a $4\frac{1}{4} \times 8$ journal, without any collar, and that is running yet, and the last time I saw it it was all right. I should be in favor of the 6 ft. 3 in. between centres.

Mr. COOKE: Do you face off all your hubs, Mr. Verbrück?

Mr. VERBRYCK: No, sir, they face themselves very shortly.

Mr. A. FORSYTHE: How much does it cost to face them in that way?

Mr. VERBRYCK: When I equipped the first passenger train in that way I asked the engineers, after it had been running for a week or two, whether it required more coal, or made any difference in running the trains, and the reply was that it made no difference.

Mr. SNOW: I think, from the looks of our wheels, that they must run a little harder. The train must be harder to draw if the boxes rub on the wheels in that way.

A motion by Mr. Schroyer, that expressing the sense of

the club that the dimension between journal centres should be 6 ft. 3 in., was carried.

It was voted to continue this discussion at the next meeting.

Special Tools for Repair Shops.

The two tools shown herewith were designed by Mr. P. Leeds, Master Mechanic of the Louisville & Nashville, and are made by Messrs. Pedrick & Ayer, Philadelphia.

The driller is designed to work on or from a drill press. It is mounted on the frame and is driven direct from the drill press spindle. It can also be mounted on the work and driven by a sliding shaft and universal joints. Drilling in all directions can be done, with the two taper shafts and the horizontal and vertical movements, by loosening the nuts shown. This machine is capable of drilling with as great speed as though drilled direct. The spindle is drilled for Morse taper sockets.

The Link miller and slotter is designed on the principle that the apex of any angle will describe all parts of an arc of a circle of which the versed sine is equal to the perpendicular where the base is formed by the chord of the arc. It can be used on a drill press, and will mill out links to any desired radius. It consists of a jointed frame having dovetailed slots running lengthways to carry a frame that has the link blank secured to it, this frame is actuated by the screw and hand-wheel and describes a circle, according to the angular position of the lower or jointed frame; flangers are cast on the bottom of this frame for the purpose of bolting down on the table or platen. In the center of the lower frame, at the centre of the joint, is a bronze bushing that is set exactly under the centre of the drill-press spindle; this serves as a lower support for a boring bar and the shank of the milling-tool arbor. In practice it is found more convenient to drill a hole in one end of the link to be slotted, large enough for a boring bar to pass through, then by using a double-end cutter the slot is cut out to nearly the finished size. The link is then moved along $\frac{1}{8}$ or $\frac{1}{4}$ in., and is cut through again until the stock is removed. A milling cutter similar to a reamer is then used, and the slot is finished to the radius for which the link is set. With this attachment a link 20 in. long is finished in about four hours.

Electric Lighting of Trains.

At the last meeting of the New York Railroad Club Dr. H. R. Waite, of the Julien Electric Company, read a paper on electric train lighting. He described at length the application of the Julien storage system on the Boston & Albany. This description was quoted almost literally from the account prepared for the *Railroad Gazette* by Mr. Geo. W. Blodgett, electrician, Boston & Albany, and published by us April 15, 1887. That portion of the paper we do not reproduce. What follows gives a brief history of the progress of the system and some estimate of the cost of lighting by it.

Almost immediately after the equipment of the first express trains on the Boston & Albany running between Boston and New York, the Pullman Palace Car Co. introduced the same system upon vestibule trains running between New York and Chicago, while the Pennsylvania Railroad at about the same time introduced it upon palace cars on their Philadelphia route. Following these equipments the Julien storage system was introduced upon the Connecticut River Railroad, the Grand Trunk of Canada, the Canada Atlantic, the Intercolonial, and later upon the Chicago, Milwaukee & St. Paul. That the system has not been introduced to a still greater extent upon American railroads is due to the well known fact that experiments have for a year and a half or more been going on with a view to such improvements as would secure all of the practical advantages of a complete isolated electric lighting plant for each separate train. It has from the outset been obvious that could this result be successfully accomplished the following advantages would follow:

1st. By generating the electrical current upon the train, a supply for lighting and signaling, if desired, would be always available, thus avoiding the many difficulties arising from dependence for charging batteries upon electric lighting stations at terminals.

2d. All of the electrical arrangements would be under control of those upon the train, thus making it possible to secure more adequate attention to the conditions necessary to successful operation.

3d. The amount of storage battery required would be

greatly reduced, thereby avoiding the necessity of carrying so large an additional weight upon trains, as well as largely reducing the cost of installations and the cost of maintenance for each train.

Experiments in the direction of realizing the results above indicated, with the use of the Julien storage battery, were carried on simultaneously by the Julien Electric Co., the Pullman Palace Car Co., and the Barritt Railway Electric Car Lighting Co.

The experiments made by the Barritt Co. upon the Connecticut River Railroad were first brought to a successful completion by the use of a dynamo and engine placed in the baggage car of a train, the power for running the engine being taken from the locomotive boiler. The train upon which this method of lighting was first successfully introduced consisted of one combination baggage car and smoker and four ordinary passenger cars, the train running between Springfield and Northampton, Mass.

The equipment for the supply of these lamps consisted of a seven horse power engine and a specially made 60-light dynamo, the total equipment in the baggage car occupying a floor space of 6 x 4 ft. with a height of 6 ft. As to the cost of maintenance, which is one of the most essential questions involved, the renewals of battery up to Jan. 19, last, including repairs of machinery and depreciation upon the entire plant, amounted to less than 5 per cent. per annum.

The results secured in connection with this method of car lighting, led to the organization, in July, 1888, of the Railway Electric Car Lighting and Signal Co., which acquired the right to the sole use throughout the United States of the Julien storage battery system, as applied to car lighting purposes, and also acquired control of the valuable patents owned by the Barritt Car Lighting Co. This consolidated company has recently placed its system on two vestibule trains on the Chicago, Milwaukee & St. Paul Railway, which, as there arranged, consists of a "Brotherhood" 4 x 3 engine, with an 80 volt 80 ampere dynamo, used in connection with 448 Julien accumulators distributed in convenient numbers in trays beneath the 14 cars of each train. This system is substantially the same as that used upon the Pullman vestibule trains running between New York and Chicago.

Some account of these experiments has appeared in recent editorials in the *Railroad Gazette*.

In the electric lighting installation found upon the Connecticut River Railroad, the Boston & Albany Railroad, and upon the trains of the Chicago, Milwaukee & St. Paul and the Pullman vestibule trains, may be found fair examples of three methods of railroad electric lighting; in the first, as applied to an ordinary passenger train; in the second, as applied to a first-class train composed of drawing-room and ordinary coaches; in the third, as applied to a full palace car train of the most luxurious equipment, consisting of drawing-room cars, sleeping cars, dining-room car, etc.

It is probable that in the installation first named, namely, that upon the Connecticut River Railroad, the opportunity for ascertaining the relative cost of electric lighting as compared with other methods, under ordinary circumstances, has been more favorable than in either of the other instances. The cost of maintenance per annum, in this instance, based upon an original outlay of \$2,500, amounts, as nearly as can be ascertained, to about \$330 per annum, as follows: Interest on first expenditure at 6 per cent., \$150; repairs to couplings, renewal of solution, etc., \$250, per month, \$30; depreciation of plant, as shown by renewals, \$100; replacing lamps, \$50; total, \$330. This makes an expenditure for each lamp of about \$4.64 per annum, or 1.49 cents in round numbers, $1\frac{1}{2}$ cents per lamp per day.

Supposing that the average amount per diem paid for services to one man employed in caring for 71 oil lamps on the same train, amounts to \$1.50 (an under-estimate) we have for this item for 310 days \$465. Add for cost of maintenance of oil lamps as above, oil chimneys, etc., per diem two cents each (the lowest estimate which I have ever heard made), \$1.42 per day for 310 days, and we have an added sum of \$440.20. Interest on original cost of oil lighting equipment for trains as above estimated, \$500 at 6 per cent. per annum will amount to \$30. Depreciation owing to wear of burners, etc., \$1.50 per month for each car, will equal \$90 per year. Adding these items, we find that the total cost of oil equipment per annum for 71 lamps will be \$925.20.

As between the two systems the apparent difference in favor of electric lighting amounts to \$595.20 per annum. It will be noted, however, that one item of expense in connection with the electric system is not here taken into account; namely, the cost of power taken from the locomotive boiler for the running of the combination machinery in the baggage car. As to what amount should be allowed in a comparative estimate as to the cost of the different systems of lighting on this account it will be difficult to say. Experience thus far upon trains where steam has been applied in this manner shows that the expense as represented by the additional power is almost inappreciable. It could not in any event represent a larger proportion of the whole cost of generating steam for the locomotive boiler, than that of 6 horse-power to 600 horse-power

As a matter of fact the actual cost would be very much less than in the ratio indicated. But supposing the steam used to represent an additional cost equal to its full amount, the value of this steam can be easily computed by a simple calculation based on the amount of coal required for every horse-power developed from the locomotive boiler. It is, I believe, generally understood, that the amount of coal required for this purpose is 7 lbs. This being true, to develop one horse-power per hour for 310 days will require $6\frac{1}{2}$ tons of coal, which, at the rate of \$4 per ton would represent a total cost for the 310 days of \$26. Supposing the daily service of the combination machinery in the baggage car on the Connecticut River road to be 6 hours, the total cost of 6 hours' service for a year of 310 days would be 6 times \$26, namely \$156. If we add this sum to the items of cost entering into a year's maintenance of the electric lighting system upon the Connecticut River road, as already presented, the total amount will be increased to \$486, as compared with \$925.20 for the oil lamp system, leaving a difference in favor of electric lighting of \$439.20 per annum. The electric light costing \$6.84 per lamp per year of 310 days, or 2.2 cents per lamp per day, and the oil lamp costing \$13.03 per lamp per annum, or 4.2 cents per lamp per day.

It may be urged that this presents an exceptionally favorable showing as to the cost of the electric system. Those who raise this objection are reminded that this estimate applies to ordinary passenger coaches running under the ordinary circumstances which will be found applicable to average trains in regular passenger service upon American railroads. It is in the lighting of trains of this character that the new system will be most widely used, when it will have once proven its adaptability to such use, and it is therefore in this application of electric car lighting that the greater number of railroad officials, as well as the public generally, are most interested. I believe that the figures above presented do not overstate the economy with which the system of railroad electric lighting, as now being introduced by the Railway Car-lighting & Signal Co., may be applied to the ordinary first-class coaches of trains in regular service upon American railroads. As a matter of fact the first application of this system has been chiefly upon special trains composed of parlor cars, where its application has involved expenditures proportionate with the lavish outlay made upon such trains in all other appointments. These trains require a prodigious supply of light, and not only this, but for a period in excess of that for which it is required under ordinary circumstances. The provisions for supply must, of necessity, be equal to the demand; and the cost of lighting upon these palace car trains under the circumstances becomes a matter of difficult computation. Moreover, upon such trains the service of employees is so adjusted to special needs, in accordance with set rules, as to make it difficult to carry into effect any arrangement by which employees already in service may successfully add the care of electric train lighting to their present duties. As a result, in most instances special employees are provided, whose sole duties are confined to caring for the electric lights. Electric lighting upon such trains, for these obvious reasons, is proportionately very much more costly than upon ordinary trains, such as those upon the Connecticut River Railroad.

I think that the working of this system of car lighting, as already demonstrated upon the railroads where it is in use, gives sufficient assurance as to its availability as a method of lighting by the use of which all of the evil results attendant upon former methods may be avoided. I believe that it is also demonstrable that the system as compared with any other system is an economical one. This certainly can be shown to be true if the comparison is based upon the relative efficiency of one system, lamp for lamp, as compared with another. But passing by the question of its relative economy the arguments in favor of the new system are so many and so forcible as to make clearly evident the truth of the statement made by Mr. Blodgett, of the Boston & Albany, viz., "The electric light has come to stay," and "it is the only one which anywhere near fills the conditions of a satisfactory light for railroad trains."

As has been stated elsewhere, "safety, health and comfort, with high illuminating efficiency, are essential conditions of a thoroughly satisfactory system of railway car lighting; and a system which meets these conditions needs only to possess the additional recommendation of economy in order to secure its adoption on all railways whose managers are abreast with the spirit of the times." Whatever doubt there may have been hitherto as to the last of these conditions, it is now, I believe, demonstrable that they have all been met so satisfactorily as to assure the general use of the electric light upon railroad trains in the near future.

American Institute of Mining Engineers.

We are indebted to the *Iron Age* for the following notes of the meetings:

A meeting of the Institute was held in New York last week. On Wednesday morning the members paid a visit to the Spiral Weld Tube Works, of which James C. Bayles is president, and then proceeded to the Edison Laboratory and the phonograph works at Llewellyn, N. J., where a trial run was made of the Edison magnetic ore separator. After an elaborate lunch, of which over 300 visitors partook, a session was held in the library of the Edison Laboratory, the proceedings being opened with a paper on "Magnetic Concentration," of which John Burkenbine and Thomas A. Edison were the joint authors.

This paper was followed by that of Pedro G. Salom, of Philadelphia, of the Julien Storage Battery Company, on "Electric Storage Batteries."

The evening session was especially devoted to iron and steel. It was opened by the reading of a communication from Mr. C. P. Sandberg, of London. Mr. Sandberg points out the evils produced by wide, thin flanges, which have gone to the extreme in America, and trusts that it will meet with a speedy correction on the part of engineers by the designing of sections that can be made harder.

He uses the bending test with sample ingots, as a preliminary, chiefly to enable the maker to avoid rolling brittle steel into rails, which might break under the falling test. Mr. Hunt is satisfied with such a preliminary test alone, and does not enforce any falling test at all. What is more, in his specification the bending tests are repeated two or three times, with a chance of ultimately getting one to stand, and having the rails consequently accepted. Mr. Sandberg has reduced the drop tests so as to admit of greater hardness; but he sees no cause to abolish them altogether.

In reference to the cutting off of blooms 12 in. at the top end, Mr. Sandberg says: Fully appreciating the importance of sound ends, I think such a heavy cut must entail great loss upon the maker; and, worse still, that it will not absolutely secure the object in view, inasmuch as hollow sinkings will not always be detected thereby. I would rather aim to obtain in casting a more solid top to the ingot, through the quality of the steel. To promote this I would tolerate more silicon, which makes the steel in casting very quiet, and permits hardly any gases to escape. From thousands of analyses I have found that with 0.10 per cent. of silicon a more solid top is obtained, while no material

effect is shown in the testing for physical qualities. My difficulty in practice is to obtain the silicon in uniform proportion. While I sometimes get accidentally $\frac{1}{4}$ per cent., at other times I get next to nothing and then I get the hollow top. Regularity in the pig iron, as to its contents of silicon as well as its heat, would rectify these irregularities in the finished article. This would be well worth the makers' attention as a means to insure both economy to themselves and sound rail ends, and satisfaction to the consumer.

The third cause of inferior steel rails nowadays, as compared with those first rolled, namely, fast driving, is perhaps the most important of the three, particularly because there is no help for it. Any one having the least experience in chemical processes must know that time cannot be dispensed with, but is necessary for dissolving, precipitating and mixing, and for the due escape of the gases produced. Again, in mechanical respects, the old mills, running at slow speed, produced a close grain in the rails, because the pressure was given in the stage of brown heat. This made the rails physically hard. It explains why different wearing results might be got from the same chemical composition. No close grain or physical hardness can be expected in the big heads— which is just the reverse of what should be the result sought. However, it is of no use to ask makers to roll slow; at least until engineers will return to thick flanges of say $\frac{3}{8}$ in., or, rather, $\frac{1}{2}$ in.; and even then the ambition to turn out a rail a minute and so many tons out of a converter will not be given up. The only remedy hoped for is that, through the adoption of these thick flanges, the steel rail might with safety be made harder chemically by admitting as much carbon (and silicon to give solidity) as the amount of phosphorus present will permit.

The second paper on the same subject was that of Mr. Frederic A. Delano, of Chicago, Ill., who said: Until very recently, it has been assumed that the more metal was put in the head to wear away the longer the rail would wear, and it has been the practice in adopting heavier sections to put all the additional weight on top of the rail-head of a very much lighter section. Careful investigation on a number of railroads has shown that of the rails weighing 65 pounds per yard and over the greater part have to be removed after comparatively trifling abrasion, solely because they are no longer fit for a smooth track. This is evidence of error in the principles of the design of the section.

I think there is evidence that the elastic limit of much of the rail steel now in use is actually often exceeded by the strains of practice, causing a flow of metal, which is then abraded by the wheel flanges, and the result is a kinking or a battering of the rail, which condemns it for a good track. Granting the existence of this cause, there are two ways of ameliorating the result, one is to increase the bearing surface of wheels on rails, the other, to raise the elastic limit of the metal, which subject I shall take up later on.

It is held by many that the enormous production, low cost, and "improvements" induced by competition have involved inferior quality of product. The fact that as many Bessemer charges are now blown in one hour as were formerly blown in a day is pointed out as evidence that the same care cannot be given to the operation; but I think men really conversant with the turning out of a large product will maintain that almost absolute regularity in the iron is necessary to keep things running with the clock work regularity required for such a rate of production. Indeed, large product and general smoothness in mill operation are, to my mind, an indication of a uniform product, so far as metal in the rail itself is concerned, and seem to me, therefore, not objectionable on that score. With the rapid rolling, however, particularly the rapid blooming or breaking down of large ingots, I find fault.

That mechanical conditions in the rail itself, due to the general design of the rail section, can have any important effect on the service-value of rails has not been generally admitted, so I wish to lay particular stress upon this cause and attract to it the recognition it deserves. Speaking in general terms, that form of rail is, in my opinion, faulty, which has a deep massive head, a wide, thin base and a thin web, connected to the head and the base by small fillets only. The objection to this form and the advantages which might be obtained by different proportions may be concisely enumerated as follows:

a. Such a form necessitates rolling at a higher temperature, and, what is of chief importance, finishing at a higher temperature than permits the securing of a well-forged, compact rail.

b. This type of section probably encourages the use of a higher percentage of manganese to reduce the number of second-quality rails, and this production of second quality, as well as the additional manganese, figure in the cost of the rails to the consumer.

c. Rails with heads out of proportion to the rest of the section require a great deal more of cold-straightening, because it is impossible to know how much bending or cambering such a rail needs in its hot state in order that it shall cool straight.

d. The same sort of disproportion must produce corresponding disproportions in the rate of cooling, causing internal strains, which are only partly dispersed or effaced by the small connecting fillets.

e. A section having these internal strains exaggerates the effect of any impurity which may chance to have segregated in the ingot, while a section not liable to these strains would safely admit of a generally higher carbon steel, as well as a considerable latitude in composition.

f. It is not economical to provide for an abrasion of some $\frac{1}{8}$ of an inch, or even more, from the top of the rail, if it is found that rails have failed long before this amount has been abraded. Instead of providing more height to wear away, we can do better by providing more breadth of bearing surface, and metal of a higher resistance within the elastic limit.

g. Inasmuch as the funnel-shaped cavity, dispersed blow holes and possible impurities exist in the ingot in the axis of its length, it follows that these defects will exist (especially in rails made from the upper part of the ingot) on an axial line which passes through the rail-section. It follows that if the rail-section has 50 to 55 per cent. of its metal in the head, the poorest metal is enclosed in the head, where it receives the least amount of forging; whereas, if the amount of metal in the head does not exceed 40 to 45 per cent., this poor metal occurs in the thoroughly worked portions.

Mr. Delano appended a set of specifications which we do not reproduce.

Mr. W. R. Hunt, of Chicago, followed with a paper on the same subject, prefacing it with a reply to the criticisms raised in Mr. Sandberg's communication. Mr. Hunt, starting from the conviction that high heat during the manufacture of the rail and a good product cannot go together, has reached the conclusion that the sections of the rail must be so designed that they can be made successfully at a lower temperature. The earlier rails, which gave such good results, were all of light sections, and they were almost all rolled at a lower heat. It was long supposed, and it is still widely believed, that chemically the metal in the older rails was superior to that now used. Mr. Hunt quoted a number of analyses of the famous John Brown rails, which showed an astonishing range of chemical composition, the only element present in relatively uniform quantities being manganese.

The facts given prove that it was not the character of the metal itself, but the method of manufacture, rolling at a lower heat and with greater roll pressure. The metal was more thoroughly worked.

The subject was discussed by Messrs. P. H. Dudley, John Fritz, E. C. Pechin, R. W. Raymond, H. M. Howe, R. Chauvenet and others, chiefly on the question of the character of the pig-iron.

The Thursday morning session opened with the presentation by C. Kirchhoff, Jr., of three communications from members of the institute on the subject of "Oil as a Metallurgical Fuel," the metallurgists reporting being G. H. Billings, of Boston; E. C. Potter, of the North Chicago Rolling Mill Co., and E. C. Felton, assistant superintendent of the Pennsylvania Steel Co., Steelton, Pa. The first named presented data from his experience with coal and oil in puddling.

The conclusion was that he gets a saving of \$232.02 per week, or \$12,065.04 per year, by using coal instead of oil. For making steam he found a saving of \$54,774 per year by using coal instead of oil.

The second paper on the same subject presented was by E. C. Potter.

Fuel oil was first substituted for coal at the South Chicago works of the North Chicago Rolling Mill Company, in September, 1888, and was first applied to the battery of boilers in the converting department. In December, 1888, the rail-mill battery of 26 boilers, of the same dimensions as those in the converting department, was equipped for fuel oil.

"With the brief experience we have had with oil as fuel we find that the efficiency of the boilers is somewhat increased and the repairs materially lessened. The perfect cleanliness of the fuel and the ease and simplicity of supply and regulation, together with the steadiness and uniformity of steam supply, make it, for our business at least, a most desirable substitute for coal. We have made no evaporation tests of any kind, the only test of its efficiency being the fact of its keeping our works running to their fullest capacity. This we find it will do, which cannot be said to be true of coal with our present boiler capacity."

The third paper, by Mr. E. C. Felton, gave the results obtained with oil at the Pennsylvania Steel Company. The experiment has not yet gone far enough to determine the relative economy of the two forms of fuel.

During the discussion Mr. R. W. Hunt reported that when he was in charge of the Troy works an experiment was made with the Hayden apparatus for burning oil. The petroleum used cost $4\frac{1}{2}$ cents at that time, while the Westmoreland coal cost \$4 per ton. Records kept over a period of three months, under practically identical conditions, showed that if oil could be had at 3 cents a gallon there would be a saving of 50 cents per ton.

J. M. Sherrerd, of the Troy Steel & Iron Company, referred briefly to the experiments now being made at that plant, conditions having considerably changed. The use of oil has been eminently successful in Troy in connection with its use to fire the boilers of the furnace plant when the gas supply happens to be inadequate. Under these conditions oil possesses the great advantage of responding quickly at a time when a prompt supply of steam is particularly needed.

The President, Professor Potter, stated that experiments at a large works in St. Louis had shown that oil at 3 cents, the price then ruling, is equivalent to \$2 coal. But as coal costs \$1.37 $\frac{1}{2}$ delivered, oil is too dear to use. In some instances, where cleanliness and a clear fire are particularly desirable, oil is preferred.

Prof. W. P. Blake, of New Haven, spoke on the copper deposits of copper basin, 30 miles southwest of Prescott, Ariz., and Mr. Henry J. Williams, of Pittsburgh, presented a paper on the "Determination of Silicon in Ferro-Silicons and a Study of its Reactions with Alkaline Carbonates."

TECHNICAL.

Standard Axles for 60,000 lb. Car.

The Master Car-Builders' Committee, Messrs. G. W. Rhodes, J. S. Lentz and R. McKenna, appointed at the Annual Convention, held at Alexandria Bay, June, 1888, to submit an axle for 60,000-lb. cars, request the following information:

1. How many cars of 50,000-lb. capacity have you in service?
2. How many of 60,000-lb. capacity?
3. Give the dimensions of the axles used under the above cars.
4. In case you contemplate any change in the above axles, give the dimensions you propose changing to.
5. Should you have no cars in service of greater capacity than 40,000 lbs., give the dimensions you recommend for 50,000 lb. and 60,000 lb.
6. Replies to these questions should be forwarded to the Chairman of the Committee, G. W. Rhodes, at Aurora, Ill., if possible by March 15, 1889.

The Manchester Ship Canal.

The London *Financial News*, after predicting that in three years' time the masts of Atlantic liners may be seen from the Manchester Town Hall, says that since the rehabilitation of the scheme early in 1887, under the financial leadership of Sir Joseph Lee, and the letting of the contract in November of that year, 12,000,000 cubic yards of excavation have been done, and excavation is now proceeding at a rate of from 1,000,000 to 1,300,000 cubic yards per month, a rate that will be greatly exceeded during the coming summer, when it is intended to work night and day. The total amount of excavation is 48,000,000 cu. yds., and nearly the whole length of the line, from the docks at Trilford Road, on the west side of Manchester, down to the estuary of the Mersey at Eastham, a few miles above Birkenhead, is opened and in some places down to grade. Mr. Walker, the contractor, has put £600,000 worth of plant on the ground. Over 80 steam excavators, "navvies," as they call them, are at work with 4,400 cars, 140 locomotives and 200 horses; and nearly 200 miles of railroad is used in wasting the excavated materials, besides a continuous line from one end of the canal to the other. The general character of an excavation is highly favorable, only a few sections have required pumping, and though a hard sandstone has been struck in places, the circumstance is said to be favorable, as the stone furnishes a very good construction material. There is no risk of the estimated cost being greatly exceeded, and the only remaining factors in the question are finances and traffic. The first of these is the issue of the debenture stock of the company, which is strongly endorsed by the *News*. Regarding the future traffic of the canal attention is called to the fact that it will not depend on Manchester alone, but will have auxiliary to the traffic of that city that from a net-work of barge canals extending to every part of Lancashire, Cheshire and Staffordshire, besides the business it will create for itself by encouraging new industries along its route, so that instead of this merely 35 miles of canal it will virtually become 70 miles of wharfage.



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EDITORIAL ANNOUNCEMENTS.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

Mr. Hickey's paper on tender trucks was printed in the *Railroad Gazette* last week, and the discussion is given to-day. It would appear from the discussion that it is quite necessary that a certain class of locomotive tender trucks should have flexible springs. This is true with engines having long fire boxes which take up all the room known as the "foot plate" of the locomotive, in the eight wheel type. As a rule the service demanded of tender trucks is much more severe than that which the average car truck has to withstand. The load is almost always heavier and more uniform than in the case of the freight car truck. This continued heavier load increases the liability of heating and breakage. In every case where we have known car trucks to be used for tender trucks, slight changes have been made to make them more durable. The large amount of moisture resulting from leakage of the tank upon the tender trucks accelerates the decay of wooden members, and therefore, as stated by Mr. Hickey, it would seem as if wood should be wholly removed from the construction. There is a difference of opinion in regard to the necessity of swing motion trucks under tenders as well as under freight cars. Among the advocates of both rigid and swing motion trucks are men of wide experience and well known mechanical ability, and the arguments offered are not easily harmonized. Certainly a swing motion rides easier than a rigid motion. Regarding side bearings the opinions of railroad men, in general, are unanimous that the side bearings on the truck and on the car body must not come in contact on both sides at the same time. The whole purpose of side bearings, as now used on American cars, is to prevent excessive rolling motion on rough tracks and on curves. Owing to the weakness of the trusses of both cars and trucks of certain classes, it has become necessary to inspect such types of cars to assure the separation of the bearings on both sides.

The discussion at the last meeting of the Western Railway Club warrants the hope that the question of the axle of a 60,000-lb. car will before long be settled. A large mileage of railroad was represented by the members present at that meeting, and the concurrence in the recommendation of the present standard distance between the centres of the journals as a standard for the axle of the 60,000-lb. car was sufficiently pronounced to show that this dimension will be strongly contested for if any other distance between centres than this is recommended at the annual convention. The journal of the 60,000-lb. axle, which would best please the majority of the members of the Western Railway Club, at the present time as shown by their expression at the last meeting, is one which can be used in the present standard oil box. The length of the journal which meets these conditions is 8 in., and the diameter, as expressed by Mr. Schroyer, anything which can be admitted into the present form of oil box without an alteration of the

distance between the centres of bolts which secure the oil box to the arch bars. It is safe to say, so far as the members of the Western Railway Club are concerned, that an almost unanimous vote would be rendered in favor of a standard axle for the 60,000-lb. car, which measures 6 ft. and 3 in. between centres of journals, the journals being 8 in. in length, and of any diameter larger than 4 in., provided it could be used in the present oil-box. Probably no other association of railroad men has given this axle question more attention than the members of this club, and their expression at this date seems to be the result of logical deductions from a consideration of the conditions and functions which the axle for 60,000-lb. cars will have to meet and fulfill. While to every other size of axle thus far presented there have been offered serious objections, yet to the form which pleases the majority of members of this club no opposing argument of any moment has yet been made; surely nothing better has been presented.

One of the most important points yet to be considered is the question of collars. Bearing upon this point evidence was brought forward at the last meeting which shows what seems to be a necessity for the removal of collars. This evidence was not then considered, but will probably be at the next meeting. It is this: Nearly every speaker testified that an inspection of a scrap pile of axles and brasses showed that a large percentage of all the hot journals was caused by the end thrust of the axle collar against the brass. This is the natural result of running two surfaces against each other under enormous pressures, without special provision for lubrication. An examination of the oil boxes in the average service, shows how little chance there is for good and long continued lubrication of the axle collar, and sufficient proof for the statement of enormous pressures is given by the knowledge of the difficulty of keeping trucks "square." If as much trouble is experienced with axle collars as stated, surely it is worth something in first cost and maintenance to have them removed. There seems to be no argument yet offered to show that a removal of the collars will increase the cost of maintenance, and it is certain that collarless axles cannot heat the journals by end thrust against the end plate as much as they are now heated by the collars, because of the decreased speed of the surfaces and the superior lubrication. A feeling of responsibility in the matter of adoption of the 60,000-lb. car axle seems to pervade the meetings of the Chicago club. As stated by one of the members, this feeling of responsibility can, probably, be accounted for by the belief that a decision and expression of opinions by this club will more or less influence the decision of the convention. Whether this be the case or not, the activity of the members, and the energetic discussion of this subject is a matter of admiration to all who believe that progress is a sure result of conscientious debate.

Seventeen pages of the 20th annual report of the Massachusetts Railroad Commissioners are devoted to the subject of accidents to trespassers upon tracks and trains; and the recommendations made for the diminution of this useless and horribly fatal class of accidents are most judicious. Careful readers know how serious this matter is and what are the difficulties of dealing with it. The Massachusetts Board has this year presented the facts in such detail as to make them unusually impressive. A complete list is given of all accidents of this class occurring during the year. They include 25 per cent. of all the killed and injured, and over 46 per cent. of all persons killed in the operation of the roads of the state. Accidents to passengers and employés are unavoidable, but to kill or injure 196 persons who have no business on or near the railroad tracks, in one small state in one year, is want on waste. There are state laws providing for the arrest and punishment of trespassers on the property of the railroads and for the appointment of employés as special railroad police, but when arrests have been made it has been difficult to get a conviction, and the arrests have been followed by retaliatory measures, such as placing obstructions on the track or burning buildings. It is recommended, therefore, that there should be a special body of state police charged with the duty of arresting people found trespassing on railroad property. This arrangement would relieve the roads from the onus of curtailing what has come to be thought a public right, and such a police would in some degree be independent of local public opinion.

The authorities in Ohio are still trying to tax railroad stocks in the hands of the holders. It is aston-

ishing how long it takes some people to learn anything. Such a tax is at once unjust and ineffective. It is unjust because the railroad already pays taxes as property. The "Big Four" and the Fort Wayne, which are the stocks chiefly affected by the recent Ohio decision, are taxed in the places where their lines run. The present effort is nothing less than an attempt to collect taxes on the property in one place and on the title in another. It is hardly necessary to add that the effort has not been crowned with brilliant success. Railroad property is not so prosperous that it can afford to pay taxes twice over. Some people make false returns; others transfer their investments. It is said that the decision of the lower court, which has now been re-affirmed, drove away nearly all the "Big Four" stock from Cincinnati. Formerly nearly nine-tenths of it was held in that vicinity; now the great majority of it has passed into New York hands. It is useless try to tax papers which can run away from you in that fashion. It simply interferes with the finances of the community without increasing the revenue. It is well to base the assessment of the property upon the market value of the securities, because this is, on the whole, the most accurate means of estimating its earning powers. But this is a very different thing from trying to tax those securities in the hands of the holders. The latter method has the authority of tradition in its favor, but nothing else. We are sorry to say that a number of states still try to practice it; but they gain very little thereby, and lose a great deal. The tax produces next to no revenue. Meantime the citizens see that "the law is an ass," and this tends to lower their respect for all law. They become accustomed to habits of annual perjury which cannot fail to have a bad effect on their consciences. The more honest a man is, the more he finds himself handicapped. Any body except a legislature or a constitutional convention would see the folly of perpetuating such a system.

A through bill of lading makes a through rate. This is the principle laid down by the Inter-state Commerce Commission in the case of the *Chamber of Commerce of Milwaukee vs. Flint & Pere Marquette and Detroit, Grand Haven & Milwaukee Railroads*. It is not necessary that there should be a formally arranged joint tariff. It is wholly immaterial whether a through rate be "quoted" or not. The freight may be billed by the initial railroad to an intermediate point, and thence rebilled by the connecting road as though it were an independent shipment. Nor is it necessary that the charges for the whole distance should be prorated. In the case in question local rates were charged from Minneapolis to Milwaukee, and portions of a through rate from that point onward. The Chamber of Commerce of Milwaukee complained because the second part of the rate thus divided was less than the whole rate from shipments originating at Milwaukee. They contended that it was, in effect, an independent rate, and that it furnished a case of unjust discrimination. The railroads, on the other hand, claimed that it was part of a through rate, basing their claim on a clause which had been stamped upon the through bills of lading. The Commission sustains the claim of the railroads, on much broader grounds than the roads themselves had dared to take, basing it not upon any particular clause in the bill of lading, but in the existence of the through bill itself. This interpretation will tend to make the workings of the short-haul clause less severe than would otherwise be the case. The longer the through rate which is taken as the limit, the less is the effect upon intermediate rates. A rate for a thousand miles will much more than pay if applied to a five-hundred mile intermediate haul; but if the thousand-mile rate is divided into two halves, it is not probable that the halves will each cover the expense of a five-hundred mile shipment. When the Inter-state Commerce law was first passed, some people feared that the short-haul clause would prevent a local road from charging local rates higher than its *pro rata* share of the through rates. This fear was soon dispelled. It is the whole rate, and not the portion of a through rate, which limits local charges. The present decision simply carries the same principles a little farther. It does not limit a railroad by a part of a through rate even when one part is to a large degree independent of the other. Apart from the questions of law involved, it is good political economy to make the through bill of lading the criterion of the through rate. It prevents the Inter-state Commerce law from interfering with shipments from distant points even when the roads cannot agree upon the system of prorating, which is thought to be so nearly indispensable in joint

tariffs. At the same time it does not open the way for any real evasion of the law, because the bill of lading prevents the goods from being marketed at any points between those of initial shipment and final destination. Whatever the railroads may do in the way of rebilling is a purely railroad affair, which does not affect the public.

Railroad Bridges in Massachusetts.

In 1887 the Massachusetts Legislature passed an act requiring the roads of the state to have examinations made of old and new bridges, and providing that reports and drawings should be sent to the Board of Railroad Commissioners. In July of that year the Board sent out a circular specifying the information required, and also made certain recommendations during the year for floors and guard rails. These recommendations we discussed at some length a year or more ago. The annual report of the Board, which is just received, gives in the report of its engineer some interesting information as to the effects of the law and of the action of the Commissioners; although we would not attribute the improvement which has been made in the railroad bridges of the state wholly or even principally to these causes. The horrible lesson of the Bussey bridge catastrophe had its effect, and the prosperity of the year 1887 made it practicable for railroads all over the country to set on foot the work of modifying their bridge structures to better fit them for the requirements of heavier traffic. We must not therefore overrate the part which state action has had in such improvements in Massachusetts or in other states.

But whatever the causes, the effects are gratifying. The report before us shows the annual expenditure of the Massachusetts roads for repairs and renewals of bridges for eight years. This expenditure in 1888 was \$1,853,614, or about \$700,000 more than in any previous year included in the table. Since the passage of the Act of 1887 nearly 20 per cent. of the railroad bridges of the state have been rebuilt or repaired and strengthened. It is not strange to find that the Boston & Providence has the largest percentage of renewals, 29.3 per cent., while on that road 39 per cent. of the bridges have been renewed and "extensively repaired."

The report is still incomplete, for it was found that in most cases the roads had not complete plans of their structures, and in some cases they had none at all. Therefore, plans of all bridges have not even yet been received and so many have come in within the last six months, that it has been impracticable to examine them carefully. Even the reports of the first inspection have but lately been completed. This condition of things shows the need and suggests the probable good effect of the law. It is quite obvious that the railroad officers know more about their own bridges now than they knew a year and a half ago.

Prof. Swain, the Engineer of the Board, states that many of the Massachusetts roads are using bridge floors that conform generally to the circular issued by the Board a year ago, but the recommendations fixing the distance of the inside guard rail from the gauge line, have not been generally followed. The recommendation of the circular was that this distance should be from 7 in. to 10 in., but the Board has since recommended that these rails should be 8 in. or 9 in. apart. Evidently practice in this particular is entirely unsettled, and has not been put on any logical basis. Drawings now before us of two bridge floors of the highest class show 6½ in. between the gauge line and the inside guard. In the discussion of this subject by the members of the American Society in 1887, Mr. R. A. Shaller proposed a space of 10 in.; Mr. W. S. Lincoln, Chief Engineer Wabash Western, recommended 8 in.; and Mr. J. A. L. Waddell proposed 6 in. A quite common practice is to put the two rails as close together as the flanges will permit, leaving room for spiking, say about 4 in. Whether a close or a wide spacing of the guard rail be adopted depends upon one's conception of its function. It is sometimes assumed that this is to prevent derailment, and for that purpose the rails should be so close as to prevent the wheels dropping between them. It is much more generally assumed that the duty of the guard rail is to guide derailed trucks across the bridge, and to keep them close to, and in line with, the track rail. On this theory Prof. Swain has considered the proper spacing.

It should be sufficient to allow the widest locomotive tire to drop between the rails; but further, it must be governed by the minimum distance between the backs of wheel flanges. This is taken at 4 ft. 5 in., as cars having wheels closer than that may be

rejected under the interchange rules of the Master Car-Builders' Association. This would give a minimum distance between the track rail and the guard rail of 6 in., with a gauge of 4 ft. 8½ in. and a rail head 2½ in. wide. To provide play another inch is recommended, making 7 in. as the allowable minimum, and Prof. Swain would prefer 8 or 9 in. to avoid contact with the rail joints. The reasoning by which this spacing has been reached seems eminently sound. If the guard rail is placed so close as to prevent the wheels dropping between the guard and track rails, derailments will sometimes be prevented, but probably it will often happen that wheels will be dragged over the rails or the rails displaced, and in either case the guard rails will be useless to prevent the truck being turned out of line, and the danger of wrecking the bridge will be increased. On the other hand if the rails are so placed that the wheels can run freely between them, there is a good chance that the derailed trucks will be held square till the train can be stopped.

Notwithstanding the intelligent efforts of the commissioners, the Massachusetts roads have not, by any means, universally adopted their recommendations. Of the fourteen corporations operating roads in the state eight use inside guard rails, two outside and four use none at all. Of those using inside guards, two have a standard spacing of 8 in., one of 6 in. and the others appear to have no general standard. The explanation in this report of the true theory of the guard rail and the demonstration of the principles which should control the spacing, will doubtless promote more uniform and correct practice in this important detail.

Train Collectors.

A train collector of skillful literary powers writes to the *Railway Age*, recounting the advantages of employing an officer of that kind. It appears that collectors are still employed on the Ohio & Mississippi, and this writer claims superiority for the system in three important points: First, the better class of men; second, their more complete control by the auditing department; third, increased chances for detecting dishonesty. Young men of good family and of cultivated minds and manners can be secured for these places. If it is insisted that conductors must always have had extensive experience in train handling, the kind of men desired can never be had, for energetic and ambitious young men of proper character will not commence their apprenticeship as freight brakemen. A man over 35 years old, in the settling stage of his life, will never learn new duties with ease and facility. Concerning the second point, superintendents have so much difficulty in securing competent conductors that a genteel appearing person who is well qualified for the management of a train has little difficulty in securing a place, even if it be true that he has been dishonest in previous situations. The trainmaster, looking solely to the good handling of his trains, overlooks the importance of the revenue department. The third point is provided for by sending collectors around with different crews, and not allowing them to become a part of any regular gang. The writer then goes on to detail the exacting duties of the person who has to deal with the public on a passenger train, holding that the versatility demanded is greater even than that required of the general passenger agent. No other place has such temptations and good opportunities to yield to them. Can he not carry his friend the length of his run, and no man be the wiser? Can he not permit a 300-mile ride on a 3-mile ticket? Has he not personal acquaintance with a large number of constant travelers, who are all too willing accomplices? For these and numerous other reasons a selection should always be made from among persons who are the best qualified for fiduciary trusts. To find these it is necessary to go outside the ranks of trainmen. The collector system should be given more importance and the collectors be placed in the line of promotion to higher offices. This is the gist of the letter.

It will be noticed that this writer, whose letter is a shrewd and effective argument against turning his class out in the cold (as the Atchison, Topeka & Santa Fe has lately done), makes no direct allusion to the expense of collectors. This is the sticking point. Whatever the advantages of the system, managers who have to closely scrutinize every dollar on the pay-roll hesitate to increase train wages 20 or 30 per cent. at a single stroke without overwhelming evidence that it will be economical, not to say profitable, to do so. It may be quite true that the probable loss from dishonest conductors, added to the expense for detectives, will aggregate a large sum during the next

one or five years; but that is a conditional matter, while pay-roll figures are a certainty; and besides, the losses from fares which are never turned into the treasury do not appear on the books. In dealing with his directors, who judge largely, perhaps chiefly, by past results—not past details—the manager must show figures, and very plain ones, too. Every time a dishonest conductor is removed it is confidently expected that his successor will prove trustworthy, and so anything like a radical measure is postponed.

The plan of taking freight conductors and making them honest, skillful and genteel passenger conductors has had its drawbacks—not to say disastrous failures—it must be admitted. Perhaps it would be well to reverse the procedure; take honest and genteel young men and make freight train men of them. This at first sounds absurd; but why not? If we continue to trust to chance that there will be a certain proportion of the freight men who will turn out to be fit for passenger running we shall continue to have unsatisfactory results—unless, indeed, superintendents learn to select men more successfully than they do. All this may be said without prejudice to freight conductors as a class, for it is hardly to be disputed that any similar class of men would turn out in just the same way. Engineers or storekeepers, machinists or bank clerks would produce a similar proportion who would yield to temptation just as quickly under the same circumstances. Training is an element in honesty as well as in other things.

On a heavy train an additional man would be useful in several ways, especially on roads where trains are manned with a scant number of brakemen; and we have heretofore referred to the possibility of utilizing such a man as collector. A train with only one brakeman back of the baggage car is badly off in many ways and at many times. A train of eight cars and three brakemen could get along quite well with two brakemen if it had a collector who could assist passengers, handle brakes in an emergency, be ready to take the rear man's place in the last resort, and perform other offices. Some of these duties could be attended to by the conductor if he were relieved of fare-collecting. A scheme of this kind would partake somewhat of the nature of the idea just mentioned; that of taking the clerical man and making a trainman of him, instead of trying to convert the latter into the former.

Roads are not wanting which seem to be quite well satisfied with "young men of good family and cultivated minds and manners" for the combined office of collector and conductor, whether they know anything about handling trains or not; but it is to be hoped that this idea will not spread.

The captain of a train does not, it is true, often encounter the courage-testing crises that fall to the lot of the commander of an ocean steamer, and with the block system and air brakes to provide for safety a train load of passenger can be got over the road in satisfactory shape nearly every time by a conductor who never stepped upon a freight car and never touched a switch; but every one will admit the likelihood of at least a small percentage of trips in which will be felt the necessity of a man who is fully the master of the situation. "It is the unexpected that happens." When a train is derailed, or is greatly delayed by unlucky freights or by snow, a thoroughly informed conductor is not only wanted but is "wanted bad." The rarity of such occasions is not a sufficient warrant for ignoring them. As the class of men competent to deal with passengers and handle money and tickets must always be of sufficiently large mental calibre to learn with facility, there is no excuse for not educating them in all kinds of train work.

While, therefore, it is by no means certain that train collectors may not yet obtain a foothold in this country, it will be seen that there are arguments on both sides of the question. There are not wanting large roads whose force of conductors has been undisturbed by the "blue-envelope" sensation for years, and the cash-fare income is satisfactory. A recent interview with a "Spotters' Agency" significantly says: "We have no work on Eastern roads; they use the duplex rebate checks." As we have heretofore pointed out, it is not utterly impossible to get reasonably honest service, at least after a time. On the other hand, many trains now require such a multiplicity of duties and so large an amount of work from the conductor that the employment of an assistant for him would no doubt be for the best interest of the employer. For a conductor to knit his brow over complicated duties for nearly every mile of a run, while the brakemen are lazily growing fat in the performance of their task of crushing the plush of one of the seats is a trifle absurd.

January Accidents.

Our record of train accidents in January, given in this number, includes 45 collisions, 72 derailments and 7 other accidents; a total of 124 accidents, in which 35 persons were killed and 113 injured.

These accidents are classified as follows:

COLLISIONS:	
Rear.....	22
Butting.....	17
Crossing and miscellaneous.....	6
DERAILMENTS:	
Broken rail.....	2
Loose or spread rail.....	4
Broken bridge.....	3
Broken wheel.....	6
Broken axle.....	4
Broken truck.....	4
Fallen brake beam.....	1
Misplaced switch.....	9
Rail out for repairs.....	1
Runaway train.....	2
Bad loading.....	1
Landslide.....	5
Accidental obstruction.....	3
Purposely misplaced switch.....	2
Unexplained.....	32
OTHER ACCIDENTS:	
Boiler explosion.....	2
Broken truck.....	2
Miscellaneous.....	3
Total number of accidents.....	124

The causes of collisions where given were as follows:

	Rear.	But-Crossing ing. and other.	Total.
Trains breaking in two.....	1	3	4
Misplaced switch.....	3	1	4
Failure to give or observe signal.....	1	1	2
Mistake in giving or understand- ing orders.....	1	1	2
Miscellaneous.....	9	3	12
Unexplained.....	5	7	12
Total.....	22	17	45

A general classification shows:

	Col- lisions.	Derail- ments.	Other acc'ds.	Total.	P. c.
Defects of road.....	9	9	9	27	21.7
Defects of equipment.....	3	15	6	24	19.4
Negligence in operating.....	26	6	1	32	25.8
Unforeseen obstructions.....	10	10	1	21	16.8
Unexplained.....	16	32	1	49	39.3
Total.....	45	72	7	124	100

The number of trains involved is as follows:

	Collisions.	Derailments.	Other.	Total.	P. c.
Passenger.....	17	20	3	40	32.3
Freight and other.....	28	52	4	84	67.7
Total.....	45	72	7	124	100

The casualties may be divided as follows:

	Col- lisions.	Derail- ments.	Other acc'ds.	Total.	P. c.
KILLED.					
Employees.....	15	8	2	25	20.2
Passengers.....	5	3	1	9	7.3
Others.....	1	1	1	3	2.5
Total.....	20	13	2	35	100
INJURED.					
Employees.....	34	38	3	75	60.5
Passengers.....	12	22	1	35	28.2
Others.....	1	3	1	5	4.0
Total.....	47	63	3	113	100

The casualties to passengers and employees, when divided according to classes of causes, appear as follows:

	Pass. killed.	Pass. injured.	Emp. killed.	Emp. injured.
Defects of road.....	4	4	5	7
Defects of equipment.....	3	3	5	5
Negligence in operating.....	5	18	16	43
Unforeseen obstructions and maliciousness.....	1	1	4	11
Unexplained.....	9	9	1	9
Total.....	8	34	25	75

Twenty-three accidents caused the death of one or more persons, and 36 caused injury but not death, leaving 65 (52 per cent. of the whole) which caused no personal injury worthy of record.

The comparison with January, 1888 and 1887, shows:

	1889.	1888.	1887.
Rear collisions.....	22	36	32
Butting.....	17	34	17
Crossing and other collisions.....	6	2	5
Derailments.....	72	151	73
Other accidents.....	7	16	13
Total.....	124	239	140
Employees killed.....	25	43	36
Others.....	10	24	20
Employees injured.....	75	107	72
Others.....	38	116	65
Passenger trains involved.....	40	118	73

Average per day:

	1889.	1888.	1887.
Accidents.....	4.00	7.71	4.51
Killed.....	1.13	2.16	1.48
Injured.....	3.65	7.20	4.42

Average per accident:

	1889.	1888.	1887.
Killed.....	0.282	0.280	0.328
Injured.....	0.911	0.933	0.978

The worst accident of the month was the Talmadge collision, which has been discussed heretofore. The derailment at Elmwood, Michigan, in which Lieut. Gov. McDonald of that state was killed, is entered as resulting from a broken truck, but the accounts are conflicting and the cause may have been something else. The tendency to enact a sweeping law of some kind whenever a disaster comes to the especial attention of legislators in session was illustrated in this case by the introduction of an act in Michigan authorizing and requiring railroad companies to remove stumps from the right of way, one of the passenger cars in this accident having been ripped open by stumps after it had fallen upon its side. We do not know how well the line of the road in question was cleared, but should think that with a roadbed decently ballasted—even with "dirt"—and provided with ditches, there would be many ways in which money could be better expended for the promotion of safety than in sawing off stumps in a country where the wood in them is worthless.

One of the most inexcusable kinds of collision is that wherein the rear cars of a train become detached while ascending a grade and run back into the head of a following

train. As this cannot happen unless the cars have come to a dead standstill, the trainmen have need of pretty fine spun theories if they decide to adopt the common expedient of trying to explain away their negligence. There is a considerable number of this class of accidents every year, and often two or three in one month. Doubtless, the real cause in many cases is that the men on the rear part of the train are asleep. This is a state of things which presents the strongest temptation to deceive in reporting the facts, and one which is the easiest to successfully conceal. After a dozen heavy cars with poor brakes once got started on the down-hill there is little chance of retrieving the blunder. Although this sort of mishap is almost certain to result disastrously, there is an occasional exception, the negligence of the men responsible being neutralized by the alertness of some one else. A case of this sort happened on the Fitchburg road, Jan. 11, which is worth noting. The New York Herald's account, after being toned down by the facts, is as follows:

"The sagacity of Edwin Warren, an engineer on a Fitchburg express train, saved that road from a disaster near Gardner. Eight heavily loaded freight cars had broken from the rear of a train ahead and were descending the grade toward the oncoming express at about 8 miles an hour. There were no brakemen upon them, and very soon there would have been a collision. The flagman of the freight, however, saw the cars, and quickly realizing the situation made a motion to the passenger engineer to back; Engineer Warren instantly applied the brakes and backed down. He then gradually slackened his speed and allowed the freight cars to gently strike the cowcatcher of the engine. There was a slight shock and again the trains parted. This movement was repeated until the cars were brought to a standstill. The passengers of the express then got off the train, and for the first time realized how near they came to a disastrous collision."

It appears that in starting the freight train a draw-bar pulled out, and the cars got under headway through the negligence of a brakeman. The man had hardly realized what happened when he saw the approaching passenger train, and, becoming scared, jumped off at once. It is probable that if he had remained at his post he could have stopped the cars.

On the Union Pacific, near Cheyenne, Jan. 6, a brakeman on a fast night freight train was killed by being knocked off a car by a goat. The animal belonged to a theatrical company, and had reached the car from the roof of a shed at a watering station. At San Francisco eight dump cars loaded with rock were tipped into the bay, together with several brakemen; the men got out of the water all right but were badly injured. We have not classed this as a train accident, as it appears that the cause of the trouble was the neglect of the men to chain the trucks to the track before tipping the bodies. The worst train accident in Canada was a collision at Montreal, by which one passenger was killed.

We have seen some correspondence touching upon the refusal of a road running to Columbus, O., to pay the customary car service for a number of passenger cars which one of its western connections furnished it at the time of the Grand Army encampment in that city last September. There apparently was no agreement beforehand, the cars being run over an intermediate road, and the bill, which is only \$60, is therefore, in one sense, a debt of honor. Usage in such matters is so uniform that any road which does not wish to pay for borrowed cars would seem bound in all fairness to refuse to receive them, or at least to protest against receiving them at the time they are offered. The reasons given for refusal to pay the bill are somewhat shuffling. First is mentioned the burden of unusual expenses incident to the general excursion traffic. This, of course, was no reason at all. Later, the custom of the X. & Y. road in using a neighbor's cars in regular traffic without paying any mileage, was brought up. This fact, even if it were not an exceptional one, could have little, if any, bearing in the case of cars lent by the A. & B. to the C. & D. road. The request that these cars be run through seems to have been made by the intermediate line, and it is apparently for the purpose of working revenge upon this road that payment is refused. But as long as payment direct to the owner is customary everywhere, this would seem to be a mere subterfuge. It savors of the spirit of the boycott and the sympathetic strike. A. injures B. because B. will not give aid in fighting C.

The relations between the Baltimore & Ohio and the Philadelphia & Reading, which have been somewhat of a mystery ever since the subsidence of the first talk of a New York extension for the former road, continue to afford about as much ground for guess work as ever; but it is now announced that the two roads, in conjunction with the Central of New Jersey, will run through trains between New York and Washington on the occasion of the inauguration of President Harrison, and that five or six trains each way daily will be run regularly after March 10, so that a traffic agreement of importance seems to have been arrived at. The Baltimore & Ohio's Philadelphia division is nearly all double track, and very fast trains are already run over it, but the connection through Philadelphia will have to be by way of the Reading main line through Fairmount Park and via West Falls station, reaching the New York line of the Reading at Wayne Junction. This route across the city will probably not afford facilities for the highest speed. The failure of the Reading to get the desired authority to extend its line from Ninth and Green to Twelfth and Market streets, in Philadelphia, is said to have had some influence in the present arrangement, and it is stated that the road will use the

Baltimore & Ohio station at Chestnut and Twenty-fourth streets, for other than the through passenger trains above referred to. That the Baltimore & Ohio has made definite arrangements with the Reading and the Central is also indicated by the resumption and active prosecution of the work on the connecting railroad between the Central of New Jersey and the Arthur Kill Bridge, which has been suspended for many months. The promise made by the Baltimore & Ohio when it secured the \$5,000,000 loan, not to build a line to New York, seems to have satisfied the Pennsylvania, so that the present scheme draws out no objection from that quarter. The new President of the Baltimore & Ohio is given the credit of bringing about this revival of the old tripartite agreement. It is also to be remembered that Mr. de Keim, of the Reading, is now in the B. & O. directory.

The Association of Accounting officers, at its meeting in St. Louis in January, accepted the report of its executive committee, recommending that the attempt to agree upon a plan of settling accounts for freight billed through, to be uniform throughout the country, be given up, and that the territory be divided into sections, with separate committees for each. President Kirkman was authorized to provide for committees according to this scheme, and has now issued a circular, suggesting the division of territory which has been decided upon as the most practicable. He names as points of meeting Atlanta, Ga.; Boston, Mass.; Chicago, Ill.; Denver, Col.; Louisville, Ky.; New Orleans, La.; Philadelphia, Pa.; Richmond, Va.; San Francisco, Cal.; and St. Paul, Minn. The meeting at Chicago is to be held at the Grand Pacific Hotel; that at St. Paul, in the directors' room at the Union Depot; at Louisville, at the Galt House; at New Orleans, at the St. Charles Hotel; at Philadelphia, in Room 3, Broad street station, and at Boston, at the Parker House.

Mr. Kirkman has appointed March 20 next, at 10 o'clock, a. m., as the time for all the meetings, and recommends that each committee shall consist of the accounting officers located in the territory indicated. He does not give definite boundaries to the divisions, and officers located at points equally distant from two or more of the cities named seem to be left to decide for themselves which group they will join. Each territorial committee should appoint a chairman and secretary and a sub-committee of three to meet with those from other sections at Niagara Falls three days before the general convention in July. Full attendance is greatly desired, and every officer who cannot be present personally should send some one to represent him.

Mr. Kirkman in his circular explains very clearly, though briefly, the whole question to be decided, which is simply that of the method of conducting auditors' settlements for freight billed through. Line freight, except on the Pennsylvania system, is generally treated the same as other freight billed through, and therefore is included in the main question. There is considerable traffic re-billed at junctions which, according to the views of many officers, is of sufficient volume and importance to be billed through. Differences between those who advocate settlements by received abstracts and those who favor forwarded abstracts should be harmonized, even if at the cost of some concession, as, if the roads can fully agree upon and adopt a plan, the joint business can then, "no matter to what extent it may grow, be handled as smoothly as the coupon ticket business, without the aid of a clearing house with its attendant expenses and harassments."

A sensational story has lately gone the rounds of the newspapers describing the tragic fate of Mr. S. V. Ryland, who is erecting the Hawkesbury bridge (New South Wales) for the Union Bridge Co. Mr. Ryland is said to have fallen from the structure into the river and to have been killed by a shark. We are happy to be able to state that the story is without the slightest foundation.

Foreign Railroad Notes.

In Bavaria now all fast trains are equipped with the Westinghouse brake. The Heberlein brake, heretofore used, which requires the combined action of the conductor and a brakeman to apply it, will be used hereafter only on mail trains.

During the year 1888 the additions to the railroads in the German Empire measured 655 miles, all but 92 miles of which were state railroads. All the new roads are worked as branch lines, and 55 miles of them are of narrow gauge.

The Prussian state railroad authorities in their estimates give a table of the new lines which it is intended to open for business in 1889, amounting to 648 miles.

The total length of the railroads belonging to the German Railroad Union Jan. 1, 1889, was 44,133 miles, having increased 1,242 miles during the previous year. Of these railroads, 24,723 miles were German, 15,420 Austro-Hungarian, 1,652 Dutch, 1,434 Roumanian, 434 Belgian, 307 Russian (Poland), 100 Luxembourg and 63 Bosnian.

Nov. 22 last was held in Berlin a conference of government officers connected with the Prussian Minister of Public Works to discuss measures for increasing the safety of railroad working, such as has been held before at intervals, the last two years before. It was reported that in that time the number of interlocking switches and signal apparatus in use had increased from 1,250 to about 1,400, and since 1878 \$1,300,000 has been expended for this purpose. To control the speed of trains a so-called electrical "wheel-toucher" has

been introduced, by which at intervals of 1 kilometer the passage of every train is telegraphed to the next station in front and rear, displaying a visible signal at those places. April 1 last 2,018 miles of line were equipped with this apparatus, and by April 1 next 2,500 miles will be. Within two years the rolling stock equipped with continuous brakes has increased as follows:

Year.	Locomotives.	Passenger cars.	Baggage cars.
1886.....	1,370	3,753	927
1888.....	2,265	6,194	1,612

Air brakes prevail, as shown below:

Brake.	Locomotives.	Passenger cars.	Baggage cars.
Air.....	1,590	4,520	1,221
Vacuum.....	179	445	48
Weight.....	505	1,229	342

It having often happened, especially in foggy weather, that engineers have been able to see a signal to stop only when very close to stations, so that they could not stop their trains in time, for some years important stations have been provided with distant signals, disks or semaphores, connected by wire with home signals, informing the engineer at a distance of several hundred yards, whether he would find a stop or an all-right signal at the station. Defects in the original system of disk signals have been remedied and the more general introduction of the distant signals is decided upon. The introduction of uniform rules for the different branches of the service has been accomplished. Special attention was called to the advantage, at stations with heavy passenger traffic, of separating the signal service and the telegraphing of train announcements from the train service.

One of the Austrian railroads which extends to the Russian (Polish) frontier has made a contract with a Vienna bank by which on shipments of Russian grain over the road, loans will be made equal to 80 per cent. of the market value of the grain at the time, 6 per cent. being charged for the loan. This is probably to offset similar action by Russian roads, which tends to divert shipments from Austrian lines. The first trial of the plan is to be made at Podwoloczyska. Those who have new stations to christen will make a note of the name.

The Austro-Hungarian "National Railroad Council" (an advisory body, representing trade, manufactures, and the patrons of the railroads) not long ago asked the government as far as possible to cause the railroads to obtain all their supplies and labor within the empire. The Ministry of Commerce in accordance with this expression has sent a circular to all the railroad managements, inviting them to regard this request as far as practicable. It says that the state railroads supply themselves almost exclusively from home manufacturers, and that in the charters of private railroads hereafter a provision will be inserted requiring them to obtain their rolling stock, rails, etc., from domestic manufacturers, unless it is proved beforehand that the terms on which they are offered are less favorable than those on which foreign supplies are obtainable. This provision will be strictly executed. Meanwhile the Ministry invites the railroad companies to report the quantities and cost of the foreign and of the total working supplies, rolling stock, bridges, rails, signal and telegraph apparatus, etc., ordered by them during the year 1888.

The Southwestern Railroad of Russia last December decided to construct grain elevators at four of its chief stations, including one of 100,000 bushels capacity at Odessa. There have been painful stories heretofore of thousands of bushels of wheat piled up in the open air for months at Russian stations.

In Russia the government appointed a commission to study the question of railroad rates, which has recently reported, recommending a general raising of the rates, especially in grain, and the government has ordered the changes recommended to be made for one year experimentally. It has a serious interest in the matter, for it guarantees dividends to most of the companies, a large number of which do not earn them, and compete fiercely with each other for traffic.

The train accident at which the Czar of Russia "assisted" has resulted in the criminal prosecution of ten of the chief officers of the railroad, the charges being as follows: Baron O. Hahn, President, as chiefly responsible for all irregularities which prevailed on the railroad, by whose acts several accidents, including that of Oct. 27 last, have been caused. It is charged that in the operation of the road his only care was to secure profit for the constructor and the virtual owner of the road, Poliakov, and a good income for himself. In following this policy he paid no attention to matters affecting safety in working the line, and so limited the expenditures for maintenance and the number of employees, that the road fell into a condition dangerous to the lives and health of passengers.

The former manager of the road, W. A. Kowanko, the Chief Engineer of Maintenance of Way, W. N. Powlof, the Superintendent of the Fourth Division, A. S. Wetrinski, and the Superintendent of the Charkor shops, G. P. Sadonzer are next charged, the first three with the bad condition of the track, and the manager, also, with permitting the train to be run faster than the regulations prescribe, and Sadonzer because, while he was on the second locomotive, he permitted the train to leave the station preceding the accident without knowing that the cock of the Westinghouse brake apparatus on the tender was out of order. The government inspector of the road, N. A. Kroneberg, and the district inspector, F. A. Gallinski, are charged with hav-

ing given insufficient attention to the condition of the road, and the former with permitting too great speed. The Superintendent of the Technical Inspection of the Protective Service, Baron A. F. Taube (apparently attached to the Czar's suite, and not to that particular railroad,) is charged with switching the train in a manner contrary to the regulations, negligence in superintending it, and with encouraging the employees of the road to increase the speed in order to make up for lost time. The engineer and his assistant are charged with not reporting to their chief, Baron Taube, defects in one of the cars and in the brake apparatus. These persons are not imprisoned while awaiting trial, but are pledged not to leave their places of residence meanwhile.

In Paris and its suburbs in 1887 the number of passenger trips amounted to 301,559,893—an average of 826,190 per day. Only one-tenth of these were by railroad, however. About 189 millions were by omnibuses, which in this district run over no less than 224 miles of routes; while 48½ millions were by street railroads, of which there are 84 miles, and 17 millions were by cabs. It is interesting to note that the average cab fare was but 1.1 francs, or about 21 cents; the average fare by omnibus was 3½ cents; by street car, less than 3 cents.

TRADE CATALOGUES.

We have received a catalogue of the Universal Milling Machines, made by Messrs. Pedrick & Ayer, of Philadelphia. This pamphlet contains a description of various milling machines and attachments which this firm has devised to fulfill the demands of the best class of railroad work. The illustrations show the precise method of mounting various special cutters to do odd pieces of work quickly and accurately. Accompanying each illustration is a description of the machine, giving its dimensions and the purpose for which it is designed. The use of milling cutters having become a necessity where duplication of parts and cheapness of first cost in production are important, it is most desirable for builders of machinery to inform themselves in what are the latest developments in the art of milling metals, this art being, as yet, in the period of infancy. The rapidity of progress in the use and development of milling cutters is such that only through careful watch of the catalogues of makers of such machinery, can one keep pace with the advance in this direction.

The Aneroid Barometer. By E. A. Giesler, C. E. Published by the Brandis Manufacturing Company. Price 25 cents.

This pamphlet opens with a general discussion of the aneroid and continues with a description of the Naudet and Goldschmidt instruments, and a discussion of the corrections. It concludes with a short chapter on the determination of differences of altitude by means of the aneroid barometer, with tables to facilitate computation.

Catalogue of Paints and Colors for Railway Use. The Sherwin-Williams Co., Cleveland, Chicago and New York.

This handsome volume, of about 170 pages, is composed principally of samples of colors for railroad use manufactured by this well known firm. Each sample is numbered for convenience in ordering. The book contains in addition several plates showing schemes of coloring for coaches, freight cars, stations and bridges, and a few designs for ornamentation and lettering. The publishers say that the volume could have been made larger, but those for whom it is intended find life too short to spend much time on unnecessary details; therefore its conciseness, together with its general style is, we believe, its chief merit.

TECHNICAL.

Locomotive Building.

The Wabash road has nearly completed two new heavy passenger engines at its shops.

The Schenectady Locomotive Works have nearly completed three more passenger engines for the Cleveland, Columbus, Cincinnati & Indianapolis. This completes the order for seven recently placed with them.

The Chesapeake & Ohio has let a contract for building four heavy passenger locomotives to be used on a new train to be run between Richmond and Cincinnati.

The Baldwin Locomotive Works have just delivered to the Buffalo Creek road two new switching engines, and the same number to the Lehigh Valley.

The Pittsburgh Locomotive Works have completed three of the four engines recently ordered by the St. Louis, Vandalia & Terra Haute.

The Kansas City, Wyandotte & Northwestern has recently received two ten-wheel freight locomotives and one switching engine from the Baldwin Locomotive Works. The company now has 16 engines in service on its road.

The Louisville & Nashville recently received from the Rogers Locomotive Works two locomotives with 21 x 24 in. cylinders. The company is about to build four passenger engines at its own shops with 18 x 24 in. cylinders.

Car Notes.

The Barney & Smith Manufacturing Co., of Dayton, O., has received an order from the Chicago, St. Paul & Kansas City for four passenger cars and two combination baggage and express cars. The company has also received an order from the Eastern Railway of Minnesota for building six passenger, three parlor and four baggage and express cars. All of these are to be fitted with the Krupp steel tire.

The Ohio Falls Car Co., of Jeffersonville, Ind., is now completing an order for 1,000 box cars, received from the Pennsylvania last December, at the rate of nearly 100 cars per week.

The Cleveland, Columbus, Cincinnati & Indianapolis is building at its shops in Cleveland 84 platform cars, and is also receiving large consignments of the 1,100 freight cars which are being built by the Buffalo Car Manufacturing Co., the Pullman Co. and the Terre Haute Manufacturing Co.

The Richmond & Danville will soon place orders for building 200 freight cars.

The Chesapeake & Ohio has recently placed a contract for building cars for four new passenger trains. It is also stated that the company will soon place contracts for additional coal cars.

The Indianapolis Car & Manufacturing Co. is still turning out cars on its order for 1,000 from the Chicago, Burlington & Quincy.

The Little Miami Railroad has under contract five new passenger cars.

The Jacksonville & Southeastern has received since Jan. 1, over 100 coal cars.

The Kansas City, Wyandotte & Northwestern received during the month of February 100 freight cars, which it has placed in service.

The Oklahoma historical exhibition, which has been formed at Wichita, Kan., has contracted with the Burton Car Co. to build a special train. The exhibition will leave Wichita, April 25, going direct to New York City.

Bridge Notes.

The Richmond, Nicholasville, Irvine & Beattyville Railroad is asking proposals for erecting a bridge over the Kentucky River, 100 ft. high and 1,200 ft. long; also, for two viaducts each 200 ft. high.

The Connecticut River road has contracted with the Boston Bridge Works for the erection of a single track iron bridge across the Connecticut River near the West Northfield (South Vernon) station of its Ashuelot Branch. This is a deck bridge 788 ft. long, and is to be completed on or before July 1.

The masonry work for the bridges on the Lincoln Park & Charlotte road has been let to Bernard A. Smith, of Rochester, N. Y., and, as stated last week, the contract for the iron bridge-work has been let to the Edge Moor Bridge Works, of Wilmington, Del.

Contracts have been awarded for erecting two iron bridges across the Red River of the North, at Grand Forks, D. T., as follows: to Van Norman & Lambert, of Minneapolis, Minn., for the substructures and approaches, \$30,242; to the Missouri Valley Bridge Company, of Leavenworth, Kan., for the superstructures, \$23,213.

A pontoon bridge is to be built between Sioux City, Ia. and Covington, Neb.

Bills have passed the House of Representatives authorizing bridges over the following rivers: Senate bill to authorize the construction of a bridge across the Missouri River near Kansas City. For bridges across the Arkansas River, near Cumming's Landing, Ark.; across the Mississippi, between Wisconsin and Minnesota; across the St. Johns River, Fla.; across the Tensas River, La.; across the Missouri River, between Leavenworth, Kan. and Platte County, Mo.; across the Ouachita River, La.; across the Kentucky River; across Young's Bay, Oregon; across Bayou Bartholomew, La.; across the Mississippi at La Crosse, Wis.; across Green and Barren Rivers, Ky.; across Osage River, Mo.; across the Mississippi at Lyons, Iowa.

Contracts for the new iron bridge over the Wisconsin River at Grand Rapids and Centralia, Wis., have been let to the Milwaukee Bridge & Iron Works for \$17,400.

A bill has been introduced in the New Jersey Legislature authorizing the construction of two bridges, one over Arthur Kill from Perth Amboy, N. J., to Tottenville, Staten Island, and one over Kill Von Kull from Constable Hook, N. J., to New Brighton, Staten Island.

The contract for the construction of an iron bridge across the Tennessee River at Florence, Ala., has been awarded. The bridge will be used jointly by the Memphis & Charleston and the Louisville & Nashville roads.

The American Bridge & Iron Co. has been organized at Roanoke, Va., to construct bridges, furnaces, etc. The engineers of the company are Chas. C. Wentworth and Joseph L. Hunter.

The time for receiving tenders for the Bay of Quinte bridge, at Belleville, Ont., has been extended to March 9.

The King Iron Bridge Co., of Cleveland, has been awarded the contract for the bridge to be constructed across Elk River, near Pulaski, Tenn., on its bid of \$7,000.

The contract for the bridge across the Mississippi for the Cleveland, St. Louis & Kansas City road is said to have been let to Baird Brothers, of Pittsburgh.

New iron and steel bridges are being erected at various points along the Cheyenne & Northern road, operated by the Union Pacific.

An increased appropriation has been secured for the bridge at Buffalo street, Ithaca, N. Y., and proposals will be received for erecting it.

The Commissioners of Colbert County, Ala., are building an iron bridge across Spring Creek, near Tusculum. The Commissioners will soon erect several other bridges in the county.

A bill has been reported favorably in the Massachusetts legislature increasing the appropriation for rebuilding the bridge across the Connecticut River between Holyoke and Hadley from \$100,000 to \$175,000.

The works of the Decatur Bridge Co., at South Decatur, Ala., were sold last week for \$23,000.

A bridge is projected across the Connecticut River from Putney, Vt., to Westmoreland, N. H., and estimates have already been made by several bridge companies.

The Berlin Bridge Co. has declared an annual dividend of 5 per cent. New machinery is being placed in the works to accommodate the increasing business.

Manufacturing and Business.

The pressure regulators made by J. M. Foster, 145 Broadway, New York, are being put on a number of locomotives now building at the Baldwin Locomotive works, and a large number have been ordered by the Pennsylvania Company for application to locomotives at the Allegheny and Ft. Wayne shops. For other than steam heating purposes they are largely in use, for vacuum pans, jacket kettles, etc. One of the 10-inch pressure regulators has been furnished to the Cincinnati water works and another one of the same size ordered for the Asheville (N. C.), water-works.

The Connecticut River Road has placed an order for ten miles of wire and picket fencing with the Betts Fencing Co. of Palmer, Mass.

The rubber hose made by the Peerless Rubber Manufacturing Co., 84 Murray street, New York City, is now in use on the Delawares & Hudson Canal Co.'s road, the Fitchburg, Boston & Maine, New York, Ontario & Western and New York, Susquehanna & Western. The last named road uses it both for air brakes and for steam heating, and the Erie is giving it a trial. The Sewall and McElroy companies have adopted this make for use in their heating systems. We understand the company guarantees the durability of its hose for an entire season when used with steam pressure of 100 lbs. per sq. in. or less. Mr. C. H. Dale, formerly Train-

master of the Hudson Division of the West Shore, is now associated with this company.

The Aetna Machine Co., of Warren, O., has received an order for a 500 h. p. engine, which is to drive a train of rolls in the new mills now being built at Hartford City, Ind., for the Chicago Steel Rail Co. The company has also received an order for two Smith furnaces and valves for the Hartman Steel Co., at Beaver Falls, Pa.

The Electric Hydraulic Co. has been organized at Pittsburgh by J. P. Witherow, R. F. McFeely and others, to manufacture electric and hydraulic machinery.

Greenlee Brothers will soon build a shop 75 x 140 ft. long and four stories high at 227 West 12th street, Chicago, which is to be used for the manufacture of their wood-working machinery.

The Phoenix Railway Supply Co. has been organized at New York, to deal in all kinds of railroad supplies and materials. L. S. Voorhees is President and E. W. Van Fleet, lately connected with the Vulcanized Fibre Co., and formerly Assistant Purchasing Agent of the New York, Susquehanna & Western, is General Manager. The New York office is at 15 Cortlandt street.

The Eastern Railroad of Minnesota has received from the Niles Tool Works, of Hamilton, O., the last lot of tools for its new shops at West Superior, West.

The Jackson & Sharp Co., of Wilmington, Del., has had its works fitted with an Edison electric light plant, consisting of 1,000 16-andle power incandescent and 42 arc lights, the latter 2,000-candle power each. The current is produced by two dynamos and the power is furnished by a Ball engine.

The Continental Steel Car Wheel Co., has been organized with a capital stock of \$100,000 to manufacture car wheels from rolled steel under the patents of T. W. Bean. It is proposed to erect works at Norristown, Pa. A recent test at the works of the Standard Iron Co., in Norristown, is said to have been completely successful.

The Hoyt Frog & Crossing Co. expect to begin work on a building at Joliet, Ill., next month, and to have it in full operation next fall.

The Johnson Railroad Signal Co., of Rahway, N. J., has recently contracted to furnish its signals to the New York Central & Hudson River, King's County Elevated, of Brooklyn, and the Philadelphia, Wilmington & Baltimore.

The D. A. Hopkins Manufacturing Co. has been formed, with offices at 113 Liberty street, New York City, to manufacture the well-known journal, invented, and heretofore manufactured, by D. A. Hopkins.

Cordley & Hayes, of 37 Barclay street, New York, have taken the agency for the sale of the goods manufactured by the Amoskeag Indurated Fibre Ware Co., of Peterboro, N. H.

The Topeka Rapid Transit Railway has adopted the Thomson-Houston electrical motor, and wishes to dispose of its steam standard gauge motor and cars. The motors weigh 11 tons, and the cars are 34 ft. long; the equipment is to be abandoned only because the company found the traffic to be too light for their economical use. J. B. Bartholomew, of Topeka, is President.

George Minch & Co. have opened an office for railroad supplies, cars, rails, etc., at No. 425 Commercial Building, t. Louis.

The South Baltimore Car Works, Baltimore, Md., are building a foundry 84x220 long, to be used for making car wheels.

At the Anniston Works of the United States Rolling Stock Co. there has just been completed a lot of 1,000 axles for the Savannah, Florida & Western.

The Intercolonial is putting in 14 additional Gould-Tisdale electric semaphore signals.

Iron and Steel.

The shareholders of the Bethlehem Iron Co. have approved the proposed increase in the capital stock of the company from \$1,000,000 to \$3,000,000.

Arrangements have been made by Parks & Lewis, of the Ohio Valley foundry, at Bellaire, O., recently destroyed by fire, to rebuild larger works on the old site.

George H. Wrightman, formerly Secretary of the Hartman Steel Co., Limited, has been appointed Northeastern agent for Carnegie, Phipps & Co., Limited, of Pittsburgh, with headquarters at No. 3 Mason Building, Boston.

Last week the Harrisburg Iron Co., which recently leased the Lochiel plant at Harrisburg, Pa., began the operation of the mills, the wages of the employees being reduced 50c. a ton. Less than 40 men accepted the reduction, but six of the furnaces are in operation.

The company has ordered a plant of Ridgway balanced cranes, by which it will load the entire product of all the mills with only one man.

A recent rise in the Monongahela river caused a break in the water main at the Allegheny Bessemer Steel Works, at Duquesne, Pa., which necessitated the shutting down of the steel department. Repairs on the main were finished this week, and the mill is now in operation.

Edmund D. Smith & Co., 222 South Third street, Philadelphia, have been appointed the exclusive sales agents for the Catoclin Furnace Co., of Maryland, whose furnaces will again go into blast probably this month. The United States Government has numerous times stipulated for this brand of pig iron in its specifications for castings.

Park, Brother & Co., Limited, of Pittsburgh, have recently completed and additional large open-hearth steel furnace.

The Jagger Iron Works, at Bethlehem, near Albany, N. Y., were sold at auction last week. The plant consists of two furnaces and includes 15 acres of land, and was purchased by P. J. McArdle for \$30,000. The works have been idle several years.

No. 3 Furnace of the Pottsville Iron & Steel Co. has blown out, owing to the dullness of the iron trade, and will remain out of blast until spring. This throws 100 men out of employment.

A foundry is projected at East Chicago, Ind., for the manufacture of chilled rolls and other heavy castings and special work not hitherto attempted in that section of the country. A new process will be used in the construction of large rolls, which, it is claimed, will greatly reduce their cost without impairing their strength or durability. The rolls will be cast hollow, and a core of silica will be inserted, which is expected to form a center of the necessary solidity. The promoters of the works claim that they have thoroughly tested their process, and have demonstrated its practicability. Plans for the foundry building are now in hand.

Contracts have been awarded as follows by the Secretary of the Navy for furnishing machines and tools for the Mare Island Navy Yard, California: Joseph J. White, Philadelphia, drilling machines, \$875; Universal Radial Drill Co., Cincinnati, counter sinking machines, \$680; George Place, New York, one 250 h. p. engine, \$16,800; Detrick & Harvey, Baltimore, planing machines, \$3,520; Bement, Miles &

Co., Philadelphia, planing, punching, straightening, bending, countersinking and drilling machines, \$16,020; Niles Tool Works, Hamilton, O., punching, shearing bending and straightening machines, \$48,593; James W. Soper, New York, Crane foundry rattler, 100 ratchet drills, \$2,390, and the Builders' Iron Foundry, Providence, R. I., hydraulic accumulator, \$2,700.

The Passaic Rolling Mill Co., of Paterson, N. J., proposes to build an open-hearth plant and a new blooming mill. Universal mill plates are now being made at the new mill completed last year.

The Lloyd-Booth Co., operating the Falcon Foundry & Machine Works, at Youngstown, O., recently added a rail turning department to the foundry and is now able to turn out a complete rolling-mill outfit. The company has nearly completed an 8-in. mill, and will soon commence work on a 10-in. mill. Within the last few months the company has sold three heavy axle and rail shears weighing 24 tons.

The Pacific Rolling Mills has completed the last of the large steel castings for the hull of the new cruiser "San Francisco," now being erected at the Union Iron Works. The casting weighs about 16,000 lbs.

The annual meeting of the stockholders of the Midvale Steel Works was held Feb. 25, and the following officers were elected: President, Charles J. Harrah; Vice-President, Charles J. Harrah, Jr.; Secretary, C. Leon Gumpert; Treasurer, John C. Dessault.

The announced reductions in wages of the employees of the Reading Iron Works, in Reading, Pa., and the Brooke Iron Co., at Birdsboro, Pa., has gone into effect. Similar reductions, to take effect at a later date, have been announced in a number of other iron mills throughout the Schuylkill Valley. The puddlers at the Reading Iron Works will hereafter receive \$3 25 per ton, and those at the Brooke Iron Co. \$3, being a reduction of 25 cents per ton at each place.

The Rail Market.

Steel Rails.—Eastern mills have secured orders during the week amounting to nearly 20,000 tons. Quotations are \$27 and higher.

Old Rails.—The market is quiet and quotations are \$23@ \$23.50.

Track Fastenings.—Quotations: Spikes, \$2@ \$2.10 delivered; angle bars, \$1.75@ \$1.85.

New Packing for the Bell Joints of Cast-iron and Earthenware Pipes.

In the *Gesundheits-Ingenieur*, Mr. O. Leonard describes a new application of celluloid for packing the joints of pipes used in conveying water, acids and other liquids in which the celluloid is insoluble and does not affect the liquid. Celluloid is a compound of paper treated with 5 parts of sulphuric acid and 2 parts of nitric acid, with the addition of pulverized camphor; the ingredients being well mixed and then subjected to heavy pressure. This compound, when heated to 280 deg. Fahrenheit, can be moulded in any desired form. It is slightly elastic. The Hyatt Brothers propose to make gaskets or thimbles of this material, with a slightly conical section, to be used in packing joints, the internal pressure in the pipes acting to prevent all leakage. It is well known that a perfect packing for earthenware pipes has not yet been found; and rubber joints are not always practicable for underground pipes. Time only will determine whether this new packing realizes the hopes of the inventors; but it seems desirable to call the attention of interested parties to the matter.

The Nicaragua Canal.

The President returned to the Senate, Feb. 20, with his approval, the bill to incorporate the Maritime Canal Co. of Nicaragua. Commander Robley D. Evans, the Naval Secretary of the Lighthouse Board, has been granted a year's leave of absence, and will go to Nicaragua as Superintendent of Construction for the Maritime Canal Co., which proposes to begin active work on the canal as soon as possible.

The Turtle Creek Improvement.

The Pennsylvania Railroad is changing the course of Turtle Creek. About two-thirds of the excavation is completed, which will confine the stream to a direct channel, and admit of reclaiming 300 acres of valuable lands from possibility of freshets as formerly. The road now skirts the crooked stream on its higher side, but the passenger tracks and the stream are to be removed about a mile further north at a point about 16 miles east of Pittsburgh, between Wall's station and Moss Side. The freight tracks are to be left where they are at present. On the tract of about 300 acres, between the old line and the remodeled creek and road, the company will erect new round-houses and shops for the Pittsburgh Division and make other extensive improvements. The contractors are Brown & Emery, Philadelphia. It is estimated that the new road will be in active operation by July.

The Rotary Snow Shovel.

The Cooke Locomotive & Machine Co., of Paterson, N. J., last week delivered to the Denver & Rio Grande a new rotary steam snow shovel, and has another one completed for it. The New York Central & Hudson River also recently received a rotary from the company.

Ajax Lead Coating.

The Ajax Lead Coating Co., of Philadelphia, has just started its works on a new process for coating metals with lead. The first order received is for a carload of nails, and this order will be filled at once. The process is applicable to a great variety of material, and a large number of orders are said to have been offered and refused because the company has not been in position to fill them yet. It is now ready to accept contracts, and will also lease rights to individual plants.

Proposed Bridges over Arthur Kill.

A bill was introduced in the Legislature of New Jersey, Feb. 20, to bridge Arthur Kill, or Staten Island Sound, from Perth Amboy to Tottenville, and from New Brighton to Constable Hook at Bayonne. The bridge at Tottenville will be low and have a draw 200 ft. long, while the other will be 127½ ft. high and will have no draw, but will have a span of 500 ft. It will cross Constable Hook and connect with the extended shore of Jersey City and Bayonne. The Riparian Commissioners favor the scheme, and it has the support also of the Joint Committee of the last Legislature, which was appointed to look into the matter. This committee has submitted a report, and a public hearing will be had on the proposal to extend the Jersey City and Bayonne shore front. A bill has already passed the New York Legislature granting the necessary power to construct the bridges.

A New Electric Railroad.

The Thomson-Houston Electric Co. has just been awarded a contract for the equipment of the electric railroad from Rochester, N. Y., to Charlotte. The contract is to be completed by June. There will be 16 cars, eight of which will be closed, the rest open. Each car will be equipped with two 15 h. p. Thomson-Houston motors, and will be lighted by five electric lamps. The power station will be equipped with

two 100 h. p. engines, and two 80 h. p. Thomson-Houston generators.

Corrosion of Steel Ships.

A case of very rapid corrosion of steel subjected to the action of salt water is mentioned by *The Engineer*. H. M. S. "Nile," which was launched last March, and had not been dry-docked or examined until lately, was found, when docked, to have lost a great part of its red lead painting and to be badly corroded near the waterline on both sides. The pitting and scoring were, as a rule, tolerably uniform. The rivet heads were greatly corroded and in some instances appeared to be completely eaten away.

Car Heating on the Rome, Watertown & Ogdensburg.

For the past three weeks the Timlin Heidinger car heater has been tested on the Rome, Watertown & Ogdensburg road and has proven satisfactory. The description and illustration of this system were published in the *Railroad Gazette*, Dec. 7, 1888. By actual test with outside temperature 10 degrees below zero, a car maintained 65 degrees after an absence of 2 hours and 45 minutes from the engine. It also worked satisfactorily when a temperature of 39 degrees below zero was encountered at Ogdensburg. This test on the Rome, Watertown & Ogdensburg road is the only one that has been made in the East, although the system has been operated successfully two winters in the West. The road has, in addition to this, four other systems on trial, which are the Martin, McElroy, New York Safety and Westinghouse. All cars running in winter passenger service are now equipped for steam heating from the locomotive.

Electric Motor for a Draw Bridge.

An iron draw at Bridgeport, weighing 300 tons, attached to the new bridge over the Pequonnock River, recently built by Dean & Westbrook, of New York, will be turned by an electric motor of 7½ horse-power, the force being transmitted from the Bridgeport electric light plant half a mile away. The motor may be reversed, so as to turn the draw either way.

THE SCRAP HEAP.

Notes.

The Union Pacific has been served with a temporary injunction restraining it from operating its telegraph lines independent of the Western Union, which had complained because the road had not afforded equal facilities for all telegraph companies over its lines. It is maintained that the charter of the Union Pacific road conflicts with the provisions of the Inter-state Commerce Law.

A press dispatch states that on the occasion of President Harrison's trip from Indianapolis to Washington, Feb. 25, over the Pennsylvania system, the company had an extra force of track watchmen on duty, and that wrecking trains were held in readiness to go out on the road at a moment's notice.

The Cincinnati, Wabash & Michigan is reported to have been boycotted by merchants of Elkhart, Ind., because Mr. Wheelock, the Auditor of the road, was active in the work of the Law and Order League which prosecuted gamblers. The General Manager was asked to remove the Auditor, but refused. The magnitude of the boycott does not appear.

An orange train of 9 cars recently ran from Ogden to Omaha, 1,032 miles, in 38 hours and 50 minutes, which is deemed remarkable for the winter season, though the run has been made in the summer in 32 hours.

The Board of Education of Bellaire, O., recently ordered the city hall clock changed from city time to Eastern standard time. There was, public excitement and clamor to have the clock set back, and finally the city council passed an ordinance to punish any one exposing a time-piece in public which showed other than local time. One report states that the entire Board of Education were placed under arrest.

The New York Legislature has exempted roads incorporated outside of this country and extending not over 30 miles into the state from the steam heating act. This applies only to the Grand Trunk, which runs but a few cars into the state.

General Manager Gault estimates the loss by the fire at the tunnel on the Cincinnati, New Orleans & Texas Pacific at \$50,000.

The Pennsylvania has just opened its twentieth interlocking tower on its New York Division, at Milham Junction, N. J. It has a 36-lever machine.

Train Robbers.

A train which was just leaving Delano, Cal., Friday night, Feb. 22, was boarded by five train robbers. When about two miles from the station the train was brought to a stop and three men entered the express car and ordered the messenger to open the box, covering him with revolvers. Dynamite bombs were exploded under the car, and during the excitement several passengers ran towards the front, and two of them were shot and killed. The train ran back to Pixley, where the news was left. The passenger cars were not molested. Delano is situated on the Southern Pacific, 200 miles north of Los Angeles.

A Lie-belous Joke.

English Tourist—What do these letters, N. Y. & N. E. on that railway carriage mean?
American Traveler—Nine years and No earnings.—*Lowell Citizen*.

Bellite.

The following tests were lately made with this new explosive at Chadwell Heath, England, in the presence of Sir I. Lowthian Bell and many others. In the first experiment some was exploded under water, sending a shower of mud and water to an estimated height of 80 to 100 ft. An iron weight of 120 lbs. was then dropped 18 ft. on a bundle of naked cartridges, which were placed on an iron plate; about half a pound of crushed bellite was then exploded on an iron rail, destroying a considerable length and throwing one piece about 14 ft. Half of one cartridge was here thrown on a furnace, where it merely ignited; the other half was exploded in an iron plate, "causing considerable destruction." One pound of ordinary blasting powder and one pound of naked bellite cartridges were placed together in an open pit 1 ft. 10 in. deep. On firing the powder some of the cartridges were thrown out. All were slightly charred but none were ignited.

A piece of bellite cartridge was then fired from a gun at a target instead of a ball; this merely powdered the bellite. As a comparative test two ounces each of dynamite and bellite were fired, showing that the action of the dynamite was more local than that of the bellite. A 6-in. ball, weighing about 32 lbs., was fired from a mortar, first with half an ounce of Curtis & Harvey's finest rifle powder, then with half the quantity of bellite. The powder threw the ball 121 ft. and the bellite 285 ft. The last experiment was the explosion of 8 lbs. of bellite which had been placed in an excavation beneath a railroad track; earth, ties and iron were thrown into the air, and a hole about 12 ft. wide and 6 deep was made, shivering the ties, twisting and breaking the rails. The experiments were made both to show its strength,

and safety from explosion by shock or heat. All of the explosions were accompanied by very little smoke. Bellite, of the maximum effect, as mentioned in the *Railroad Gazette* of Feb. 15, is made by coating 85 per cent. of ammonium nitrate with 15 per cent. of dinitrobenzene.

The Melchizedek 'Bus Angel.

The acerbities of religious contention seem to have an influence on business matters out in Utah. The following is from a Salt Lake City paper of recent date:

The Melchizedek 'bus angel on the Denver & Rio Grande Western train is now amusing himself by taking from passengers Walker House 'bus tickets given to them further down the road, on the ground that they are no good, and that the Walker and Metropolitan are side, two and four-bit lodging-houses. These tickets the angel presents as a peace offering to the Far-Shooting Heber J. Apollo, and in return receives filthy lucre and a promise of one seat higher in the Mormon heaven for each 25 tickets thus collected. In this way the angel hopes to get up so high that by fall he can be chosen cup-bearer to the holy college of Apostles, and when he gets ready to douse his earthly glim, to have ready for him a pair of diamond-studded wings, a velvet coat that never wears out, and a box of Henry Clay Partaga cigars that grow as fast as they are smoked.

Burning of the Forth Bridge Shops.

The *Financial Times* relates that through the explosion of a naphtha lamp in an engine-house of the bridge works on Inchgarvie Island, the engine-house caught fire, and the flames spread to the time office, smithy, fitting shop and painting shop, all of which were burned to the ground. The damage would have been much greater, if it had not been for the efficient services of a party of sailors from a war vessel stationed near by.

General Railroad News.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Cincinnati, Indianapolis, St. Louis & Chicago, quarterly, $1\frac{1}{2}$ per cent., payable March 15.

Delaware & Bound Brook, quarterly, 2 per cent., payable Feb. 19.

Eastern (Massachusetts), 3 per cent., on preferred stock, payable March 1.

Ft. Wayne & Jackson, semi-annual $2\frac{1}{2}$ per cent. on preferred stock, payable March 1.

West Jersey, semi-annual, $3\frac{1}{2}$ per cent. payable March 15.

West Jersey & Atlantic, semi-annual, $2\frac{1}{2}$ per cent., payable March 15.

Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Atchison, Topeka & Santa Fe, annual meeting, Topeka, Kan., May 9.

Atlanta & Charlotte Air Line, annual meeting, 48 Wall street, New York, March 13.

Cairo, Vincennes & Chicago, special meeting, Cairo, Ill., April 25.

Chicago, St. Louis & New Orleans, annual meeting, Memphis, Tenn., March 29.

Chicago, St. Louis & Pittsburgh, annual meeting, Union Depot, Indianapolis, March 20.

Cleveland, Chagrin Falls & Northern, special meeting, Cleveland, O., March 27.

Cleveland, Columbus, Cincinnati & Indianapolis, annual meeting, Cleveland, O., March 6.

Illinois Central, annual meeting, 78 Michigan avenue, Chicago, Ill., March 13.

Kansas City, St. Louis & Chicago, annual meeting, St. Louis, Mo., March 12.

Louisville, New Albany & Chicago, annual meeting, 31 Nassau street, New York City, March 13.

Mississippi & Tennessee River, annual meeting, Memphis, Tenn., March 29.

Missouri Pacific, annual meeting, St. Louis, Mo., March 12.

New Orleans & Northeastern, annual meeting, New Orleans, La., March 4.

Peoria, Decatur & Evansville, annual meeting, Peoria, Ill., March 5.

St. Louis, Iron Mountain & Southern, annual meeting, St. Louis, Mo., March 12.

Texas & Pacific, annual meeting, 195 Broadway, New York, March 6.

Railroad and Technical Conventions.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *Railroad Commissioners* of the several states, will, by invitation of the Inter-state Commerce Commission, hold a conference at Washington March 5. Subjects for discussion: Uniform railroad statistics; Uniform classification of freight; Railroad legislation; Regulation of railroad construction; Heating and lighting of cars; Automatic couplers and Continuous brakes.

The *Claim Agents' Association of the Eastern, Middle and Southern States* will hold its third annual meeting at the Hygeia Hotel, Old Point Comfort, Va., March 7. F. B. Goodall, of the Pennsylvania, at Philadelphia, is Secretary of the Association.

The *New England Railroad Club* will hold its annual dinner and meeting in Boston, March 13.

The *American Railway Master Mechanics' Association* will hold its next annual convention at Niagara Falls, beginning Tuesday, June 18, with headquarters at the International Hotel. All who wish to secure rooms should apply to Mr. A. H. Gluck, Manager, International Hotel, Niagara Falls, N. Y.

The *National Association of General Passenger & Ticket Agents* will hold its thirty-fourth annual meeting at the Hotel Brunswick in New York, March 19.

The *National Association of Railway Surgeons* holds its annual convention in St. Louis, Mo., May 2, 1889.

The *New England Railroad Club* meets at its rooms in the Boston & Albany passenger station, Boston, on the second Wednesday of each month.

The *Western Railway Club* holds regular meetings on the third Tuesday in each month at its rooms in the Phenix Building, Jackson street, Chicago, at 2 p. m.

The *New York Railroad Club* meets at its rooms, 113 Liberty street, New York City, at 7:30 p. m., on the third Thursday in each month.

The *Central Railway Club* meets at the Tift House, Buffalo, the fourth Wednesday of January, March, May, August and October.

The *American Society of Civil Engineers* holds its regular meetings on the first and third Wednesday in each month

at the House of the Society, 127 East Twenty-third street New York.

The *Boston Society of Civil Engineers* holds its regular meetings at its rooms in the Boston & Albany station, Boston, at 7:30 p. m. on the third Wednesday in each month.

The *Western Society of Engineers* holds its regular meetings at its hall, No. 67 Washington street, Chicago, at 7:30 p. m., on the first Tuesday in each month.

The *Engineers' Club of St. Louis* holds regular meetings in St. Louis on the first and third Wednesdays in each month.

The *Engineers' Club of Philadelphia* holds regular meetings at the house of the Club, 1,123 Gerard street, Philadelphia.

The *Engineers' Society of Western Pennsylvania* holds regular meetings on the third Tuesday in each month, at 7:30 p. m. at its rooms in the Penn Building, Pittsburgh, Pa.

The *Engineers' Club of Kansas City* meets at Kansas City, Mo., on the first Monday in each month.

The *Civil Engineers' Society of St. Paul* meets at St. Paul, Minn., on the first Monday in each month.

The *Montana Society of Civil Engineers* meets at Helena, Mont., at 7:30 p. m. on the third Saturday in each month.

The *Civil Engineers' Club of Kansas* holds regular meetings on the first Wednesday in each month at Wichita, Kan.

American Institute of Mining Engineers.

At the meeting of the Institute Feb. 21, the following officers were elected: President (to serve one year), Richard Pearce, Argo, Col.; vice-presidents, to serve two years, Eckley B. Cox, Drifton, Pa.; Charles McDonald, New York; Percival Roberts, Jr., Philadelphia; managers, to serve three years, J. H. Bromwell, Roanoke, Va.; Frank Firmstone, Easton, Pa.; W. H. Pettie, Ann Arbor, Mich.; Secretary, to serve one year, R. W. Raymond, New York; Treasurer, to serve one year, T. D. Rand, Philadelphia.

The institute now has a membership of nearly 2,000, over 100 members having been elected at the meeting.

Engineers' Club of St. Louis.

The 302d meeting was held Feb. 20, Vice-President Nipher in the chair, 27 members and 6 visitors present. Messrs. Whitfield Farnham, E. L. Goldstein, Frank S. Ingolsby and R. H. Phillips were elected members. Professor Johnson, from the committee on highway bridges, reported that, in conjunction with the committee from the Kansas City Club, the revised bill had been submitted to the Legislature.

Professor Johnson read a paper on "Cast Iron—Strength, Resilience Tests and Specifications." The paper was illustrated by drawings. The tensile strength of the specimens tested varied from 17,000 to 36,000 lbs. per sq. in. Experience does not bear out the commonly accepted theory that the outside portion of a casting is stronger than the inside. In the author's opinion the resilience, or the ability of the casting to withstand shocks, is by far its most important characteristic. He showed that repeated shocks resulted in a loss of resilience.

Mr. William B. Knight read a brief discussion on Professor Johnson's paper on cable yokes, showing that the strength of the yokes did not affect the slot closure. In some cases it had been found necessary to break the yoke in two at the bottom, which had caused no bad results. He thought that a good road could be built without yokes. In discussion Mr. McMath stated that at all cable crossings of the Citizens' road of St. Louis the yokes had been separated without trouble. Professor Johns suggested that if some one would go a step further and build a cable road without yokes it would settle the matter.

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Delaware, Lackawanna & Western.—The following is the Board of Managers, elected at the recent annual meeting: John I. Blair, George Bliss, Percy R. Pyne, Wilson G. Hunt, Elias S. Higgins, Benjamin G. Clarke, Sidney Dillon, Russell Sage, Edgar S. Auchincloss, Andrew T. McClintock, Gardner R. Colby, William H. Appleton, W. W. Astor and Henry A. C. Taylor. Samuel Sloan was re-elected President, Fred. F. Chambers Secretary and Fred. H. Gibbons Treasurer. The only change is the substitution of Henry A. Taylor for Jay Gould, resigned.

Denver & Salt Lake Short Line.—The incorporators of this new Colorado company are: W. A. H. Loveland, H. B. Chamberlin, Edward L. Berthoud, Frank W. Loveland and John P. Brockway, of Colorado, and Henry Steers, Orson Adams, E. E. Gedney, Maurice B. Flynn, Theodore Moss, T. Motley, William H. Brown, of New York City, and Jacob Lefever, of New Paltz, N. Y.

Des Moines & Kansas City.—Theodore C. Sherwood has been appointed General Freight Agent of the company, with headquarters at Des Moines, Ia.

Duluth Crookston & Northern.—The incorporators of this Minnesota company are: R. J. Montague, E. M. Walsh, William Anglin, John Locken, John McKinnon and John McLean.

Duluth Incline.—The following is a list of the officers of this road: J. R. Myers, President, Duluth, Minn.; Morris Briffeld, Vice-President, St. Paul; B. F. Myers, Secretary, Duluth; H. H. Myers, General Manager & Treasurer, Duluth; Samuel Diescher, Chief Engineer, Pittsburg, Pa. The principal office is at Room 18, Board of Trade Building, Duluth.

Duluth & Superior Belt Line.—The officers of this new company are: Charles M. Vance, President; Morris Thomas, Secretary; E. A. McNair, Treasurer, and E. C. Gridley, General Manager.

Fort Worth & Albuquerque.—The incorporators of this Texas company are: Major K. M. Van Zandt, W. F. Somerville, M. C. Hurley, Max Elser, J. F. Tierney, R. A. Rogers and C. C. Allen. At a meeting of the directors Major K. M. Van Zandt was elected President; W. F. Somerville, Vice-President, and C. C. Allen, Secretary and Treasurer.

Indianapolis & St. Louis.—The stockholders of the road held their annual meeting last week and elected as directors for the ensuing year: J. D. Layng, Stevenson Burke, H. H. Poppleton, James Barnett, Amos Townsend, T. P. Handy and John T. Dye.

International & Great Northern.—The Receivers have appointed Col. W. S. Herndon, General Solicitor, and Horace Chilton and John M. Duncan, of Tyler, Tex., Attorneys for the road.

Iowa Central.—J. H. Redmon has been appointed Superintendent of the road, which will be taken out of the receiver's hands March 1 and turned over to the reorganized company.

Junction.—The incorporators of this new Illinois company are: Marvin Hughitt, Albert Keep, J. M. Whitman, W. H. Stennet, M. M. Kirkman, Charles E. Simmond and J. B. Redfield, all of Cook County.

Lake Erie, Essex & Detroit River.—Officers have been elected as follows: President, H. Walker; General Manager and Treasurer, E. Chandler Walker; General Freight & Passenger Agent, William Woolatt; Master Mechanic, C. Hanson, all with office at Walkerville, Ont. Joseph Legatt is Secretary and Joseph De Gurse is Chief Engineer, with office at Windsor, Ont.

Lake Shore & Michigan Southern.—President Newell issued the following notice last week: Mr. J. O. Osgood has resigned the position of Chief Engineer of this company's lines. Mr. G. H. Kimball has been appointed Chief Engineer, and will assume the duties of that office March 1.

Newport & Cincinnati Bridge Co.—At a meeting held Feb. 21 the following directors were elected: T. D. Messier, A. S. Berry, M. J. King, T. B. Youtsey, C. H. Kilgour, W. A. Goodman and Ralph Peters. The old officers were elected as follows: T. D. Messier, President; A. S. Berry, Vice-President; S. B. Liggett, Secretary; J. E. Davidson, Treasurer; Ralph Peters, Superintendent.

Newport News & Mississippi Valley Co.—The following appointments on the Eastern Division have been announced: J. L. Murphy to be General Freight, Passenger and Ticket Agent, vice W. W. Monroe, resigned; S. A. Bromberg to be Assistant and Soliciting Passenger Agent, and W. B. Darrow to be Car Accountant, vice S. A. Bromberg, transferred. The headquarters of all are at Lexington, Ky., and the appointments take effect March 1.

Newry.—The following directors have been elected: President, Joseph Fichtner; J. N. Du Barry, John P. Green, Adam Hoover, Alexander Knox, Amos R. Little, Francis McCoy, Henry McIntosh, Wistar Morris, William A. Patton, G. B. Roberts, N. Parker Shortridge, Henry D. Welsh.

Northern Pacific.—Joseph McCabe, Chief Dispatcher of the St. Paul division, has been appointed Superintendent of the division, to succeed M. C. Kimberly, who succeeds N. D. Root as Assistant General Superintendent.

Philadelphia & Trenton.—The following directors have been elected: G. M. Dorrance, G. B. Roberts, Wistar Morris, Alexander Biddle, N. P. Shortridge, J. N. Du Barry, A. M. Fox, Henry D. Welsh, W. H. Wilson, H. H. Houston, Frank Thomson, Amos R. Little.

Pittsburgh, Cleveland & Toledo.—The stockholders on Feb. 21 elected the following board of directors: C. H. Andrews, L. E. Cochran, Youngstown; W. W. Peabody, Orland Smith, Cincinnati; David Lee, Zanesville; R. T. Devries, Newark; J. H. Collins, Columbus; Wm. McCreery, James Callery, H. W. Oliver, Jr., John S. McCleary and C. S. Wight, Pittsburg. The directors elected Orland Smith, of Cincinnati, President; O. W. Kyle, of Youngstown, Secretary and Treasurer, and J. B. Washington, of Pittsburgh, Auditor.

Richmond, Nicholasville, Irvine & Beattyville.—The officers are: A. E. Richards, President, and W. Cornwall, Jr., Secretary and Treasurer, of Louisville. J. H. Pearson, of Nicholasville, Ky., is Chief Engineer.

Rochester & Glen Haven.—At a meeting held last week the directors elected the following directors: F. S. Minges, E. P. Crouch, John D. Lynn, James Palmer, Jr.; John Connor, Edward Appel, S. A. McKenney, Edward W. Maurer, Frank Ritter, W. C. Gray, F. A. Shale, T. H. Groves, B. F. Martin. Officers were elected as follows: President, F. S. Minges; Vice President, Frank P. Crouch; Treasurer, James Palmer, Jr.; Secretary, Edward W. Maurer; Chief Engineer, William C. Gray; Attorney, Edward W. Maurer.

St. Johnsbury & Lake Champlain.—D. C. Prescott has been appointed Assistant General Freight Agent.

St. Louis & Chicago.—T. J. Cavitt, of Litchfield, Ill., has been appointed Receiver.

San Diego & Eastern Terminal.—The incorporators of this company are W. A. Carlson, Thomas Higgins, F. Dixon, H. G. Christensen and J. P. Burt.

Terminal City.—The officers of this Nova Scotia company are: Charles H. Lewis, President; H. M. Pearl, Secretary; and Frederick R. Page, Chief Engineer. The office is at 31 Milk Street, Boston.

Texas & Pacific.—G. H. Turner has been appointed Assistant General Freight Agent, with headquarters at Dallas, Tex.

Fremont, Elkhorn & Missouri Valley.—Henry C. Cheney has been appointed Assistant General Passenger Agent of this road and the Sioux City & Pacific. The office of Southwestern Passenger Agent of those companies has been abolished.

Union Pacific.—Taking effect March 1, the Kansas Central and the Leavenworth, Topeka & Southwestern lines will be detached from the Kansas Division, and operated as the Leavenworth Division. W. H. Baldwin, Jr., has been appointed Manager of the Leavenworth Division, with headquarters at Leavenworth, Kan.

C. H. McKibben has been appointed Assistant General Purchasing Agent, with headquarters at Omaha, Neb.

Waverly & New York Bay.—W. J. Sewell, of Camden, N. J., has been elected President and William Taylor, of Philadelphia, Secretary and Treasurer.

Western Pennsylvania.—At the recent annual meeting the following directors were elected: J. N. Du Barry, President; John P. Green, Wistar Morris, G. B. Roberts, Henry D. Welsh.

West Side Connecting.—The following are the names and addresses of the officers of this company: President, George W. Helme, Jersey City; Vice-President, H. W. Douty, Philadelphia, Pa.; Secretary, George Holmes, Jersey City; Treasurer, D. G. Gautier, New York; Chief Engineer, Frank H. Earle, Fuller Building, Jersey City.

OLD AND NEW ROADS.

New Companies Organized.—Canadian & Western.—Colorado & Pacific.—Dallas, Pacific & Southeastern.—Denver & Salt Lake Short Line.—Duluth & Superior Belt Line.—Ft. Worth & Albuquerque.—Junction.—San Diego & Eastern Terminal.

Alabama.—Bills have been introduced in the Legislature to incorporate the Alabama & Texas, the Gulf & Chicago, the Florence Belt Railroad & Improvement Co., the Tuskegee, Tallahassee & Syllacauga, and the Mobile & Eastern Shore railroad.

Cairo, Vincennes & Chicago.—A special meeting of the stockholders of the company will be held in Cairo, Ill., April 25, to determine whether the company will authorize the execution of a mortgage to secure an issue of bonds to be used in the purchase of the property, rights, franchises and equipments of the railroad now known as the Cairo Division of the Wabash, St. Louis & Pacific, and to vote upon the agreement proposed by the board of directors of the company for its reorganization.

Canadian Pacific.—The bill introduced in the Canadian Parliament, referred to in these columns recently, to give the company power to consolidate the capital charges on its entire system will empower the company to issue consolidated debenture stock bearing a rate of interest not exceeding four per cent. The stock shall, subject to priorities created in respect of charges existing at the time of such issue and to the payment of operating expenses as at present defined by law, become the first charge upon and over the whole of the undertaking, railway works, rolling stock, plant, etc., including all rights in the several railroads held by it under lease and all branches or extensions of railroad held either as lessees or proprietors, as well as those hereafter acquired or constructed by the company. But the charge created by such stock on any branch or extension of any railroad or any part thereof held and operated by the company and lying in whole or in part beyond the international boundary of the Dominion, shall be according to the law of the territory in which such branch or portion or extension thereof is situated. Part of the stock is to be issued for improvements to railroads held and operated by the company, including double tracks, sidings, permanent bridges, etc.

Canadian & Western.—A petition has been presented in the legislature at Vancouver, B. C., for the incorporation of the company to build a road from or near Butte inlet to the British Columbia boundary line via the Yellow Head pass, where it will connect with the road from the east which will reach Winnipeg over the Manitoba & Northwestern road.

Central Counties.—A bill is before the Dominion Parliament asking for a charter for this company to construct a road from a point in Stormont or Russell counties, on the Canada Atlantic, to Rockland, Ont., with a branch line to Ottawa City. Also for the extension of the road across the Ottawa River by bridge to Buckingham, and up the Lievere River and to Gilmors Mills on the Gatineau River.

Central Massachusetts.—The branch of this road intended to reach the Connecticut River at Holyoke, or some other point on the Connecticut River south of Northampton, Mass., the western terminus of the main line, and which was talked about at the time of the completion of the main line but not built, is now being re-surveyed. A line is being run from Bondville westward, following the Chicopee River. To make connection with the proposed line of the Hartford & Connecticut Western, and thus reach the Poughkeepsie Bridge, this branch would have to touch the Connecticut River at a point near Springfield.

Central of New Jersey.—The company has made a contract with the Pennsylvania, by which it will use the tracks of the latter road from Phillipsburg north to Belvidere, N. J., 14 miles. This will enable it to run its trains to a connection with the Lehigh & Hudson River road. The Lehigh & Hudson River connects with the road to the Poughkeepsie Bridge.

Chicago & Atlantic.—Judge Gresham, in the United States Court at Indianapolis, has entered a decree of foreclosure and sale in the case of the Farmers' Loan and Trust Co. against the Chicago & Atlantic for \$8,874,764.16. W. P. Fishback was designated as master in chancery to make the sale. An appeal from the decree was granted upon filing bond in the sum of \$125,000, with sureties to the approval of the court. The foreclosure is upon the first mortgage bonds of the company.

Chicago & Northwestern.—The company has filed in Illinois articles of incorporation of the Junction road, which is to be constructed and operated by the Chicago & Northwestern as a connection between the Milwaukee and Wisconsin Divisions of its road, beginning at a point near North Evanston, and running to Montrose, Cook County, Ill. The capital stock is \$10,000,000.

Chicago, St. Louis, Kansas City & Galveston.—The Chicago, Hannibal & Springfield has been consolidated with this company, and it is announced that W. E. Williams, Chief Engineer, is going over that part of the line in Missouri, which was surveyed last fall. He is in company with several persons who are supposed to represent investors. The officers of the company are in the Rialto Building, Chicago.

Cincinnati & Birmingham.—The contract is said to have been let for building this road, and it is stated that if a few more of the towns in Northern Alabama will vote to aid the company construction will begin within two months.

Cincinnati, Hamilton & Dayton.—Henry S. Ives and George A. Staynor, who gained considerable notoriety last year by various unusual acts, as officers of this road, have lately spent some time in imprisonment in New York city on various accusations. They were this week brought into the Court of General Sessions to answer to four indictments brought against them and Edward Wilson Woodruff, whom they made Secretary of the road. The first charges them with the larceny of sixty-five \$1,000 bonds of the Cincinnati, Richmond & Chicago Railroad. The second charges the larceny of certificates for 500 shares of preferred stock (\$50,000) of the Cincinnati, Hamilton & Dayton. The third alleges that the three defendants, as officers of the Cincinnati, Hamilton & Dayton, fraudulently issued certificates of stock of that company for \$6,000,000, without authority and with intent to defraud. Ives and Staynor entered formal pleas of not guilty, with leave to withdraw them within a week.

Cincinnati Southern.—The bill authorizing the renewal of the lease, by which the Cincinnati, New Orleans & Texas Pacific operates the Cincinnati Southern has passed the Lower House of the General Assembly of Ohio and is now a law. As was stated last week, the road is owned by the city of Cincinnati, and the law just passed authorizes the trustees to extend the lease for such time as may be agreed upon, not exceeding a period of 40 years after the expiration of the existing lease, which runs for 17 years. The minimum rental is fixed at \$1,250,000. The Sinking Fund Commissioners are authorized to extend the \$10,000,000 first-mortgage bonds for forty years at a rate of interest not in excess of 4 per cent.

Colorado & Pacific.—This company has been incorporated in Colorado, with a capital stock of \$3,000,000, to construct a road from Trinidad, Las Animas County, in a westerly direction, following the Las Animas River along the South Park and through the San Francisco Pass to the state line of Colorado and New Mexico, thence in a westerly direction, by the most feasible route, to San Francisco, via Taos, New Mexico.

Columbus Southern.—Over half the grading on this Georgia road has now been completed, and it is expected that tracklaying on the line will begin shortly, and the road opened by next November. The line will extend from Columbus southeast to Albany, Ga., 87 miles. J. W. English, of Atlanta, is the contractor, and J. W. Green, of Columbus, is Chief Engineer.

Covington, Alamo & Dresden.—Incorporated in Tennessee by W. C. Royce, J. C. Boals, R. H. Green and others, to build a road from Covington northeast to Alamo, and thence to Dresden, a total distance of about 60 miles.

Covington & Macon.—It is stated that this company has passed into the control of the Richmond & Danville, by the purchase by that company of \$97,000 of six per cent. first-mortgage bonds. The road now extends from Athens south to Macon, Ga., 107 miles.

Dayton & Faunsdale.—This road has been nearly completed from Dayton to Faunsdale, Ala., eight miles. King & Hannon, of Selma, Ala., are the contractors.

Denver & Rio Grande.—About 1,200 men are at work on the two extensions of this road now building. About 600 men are at work under Scullen & Stacy on the extension of the Lake City branch from Sapinero to Lake City, Col., 36 miles. About 12 miles of this line is through a precipitous canyon. It is expected to have it built by July 1. There are also about 600 men grading the line from Glenwood Springs west to Rifle Creek, 26 miles. McMurtree & Streator, of Denver, have the contract.

Denver & Salt Lake Short Line.—This company has been chartered in Colorado to build a road from Denver to Salt Lake through the counties of Arapahoe, Jefferson, Boulder, Gilpin, Clear Creek, Summit, Grand Eagle, Routt, Garfield, Pitkin and Mesa in Colorado, and the counties of Uintah, Wabash, Utah, and Salt Lake in Utah.

Dexter & Piscataquis.—The contract for grading this short Maine road will be let about April 1. The contract for the masonry on the line has been let to J. S. S. Maxwell, of Dover, Me. The road has been located, and is to extend from Dexter to Foxcraft, near Dover, 16 miles, and is to be completed by Dec. 1 next. It will connect at Foxcraft with the Bangor & Piscataquis road, and will be operated under lease by the Maine Central when completed.

Duluth, Crookston & Northern.—This company has been organized at Crookston, Minn., to build a road from Crookston east to a point on the proposed Duluth & Winnipeg.

Duluth Incline.—This company is building a road from a point in the village of West Duluth, Minn., four miles from Duluth, up the St. Louis River and about the head of deep water navigation, to a point back of West Duluth to the summit of the hill, which is 630 ft. above the line of Lake Superior, the line to be about 1½ miles long. The object is to open up a residence district overlooking the whole bay of St. Louis, the city of Duluth, and the village of Superior across the Bay in Wisconsin. West Duluth has located in the last year the Minnesota Car Co., Duluth Iron & Steel Co., and the J. B. Adams hardwood finishing works, three large manufacturing concerns. These will be ready to commence work in less than three months, and employ a total of 1,500 men. The terminus of this line is in the vicinity of these manufacturing concerns. The line is surveyed and the greater portion of the right of way secured. The contract for the line will be let about May 1, and it is expected to have it opened for traffic during the summer. The object of the road is to haul passengers and freight from all connecting lines at West Duluth up the hill to the summit, whence they can easily reach any point on the lower levels. The road will be constructed on the principle of the inclines at Pittsburg, Pa. H. H. Myers, of Duluth, is General Manager.

Duluth & Superior Belt Line.—This company has been chartered in Minnesota to build a belt road around Duluth and Superior Bays. The road will start at the Union Depot in Duluth, will run out on Rice's Point, cross to Connor's Point, pass through West Superior and Superior, cross the natural entry at Superior to Minnesota Point, run its length to the canal, cross to the main line and back to the Union Depot, making a complete circuit of the bay.

Evansville, Ft. Wayne & Chicago.—A contract is said to have been let to a St. Louis construction company for the grading and bridging of that portion of the road between Lafayette and Fort Wayne, Ind., a distance of 108 miles, for \$336,841. This will complete the road bed ready for the track. All of this work will be done along the tow-path of the old Wabash & Erie Canal and will be very light. H. Drew of Indianapolis, and E. W. Shirk of Peru, Ind., are among the projectors.

Evansville & Richmond.—A survey has been made for a belt road at Columbus, Ind., to be built and controlled by this company, and it is stated that all the right of way necessary has been secured.

Evansville & Terre Haute.—The purchase by this company of the Illinois & St. Louis, extending from East St. Louis to Belleville, Ill., has been consummated, and President MacKay is quoted as follows: "We pay 125 for the preferred stock, which carries the control of the property. This represents a payment of \$1,125,000. We think we have acquired a very fine piece of property, which was indispensable in order to secure a direct connection with St. Louis."

Flint & Pere Marquette.—The directors have made an arrangement with the Port Huron & Northwestern by which that road will pass into the control of the Flint & Pere Marquette on April 1, subject to the condition that a special act of the Legislature shall authorize the acquisition, it being doubted whether there is a law in force which would make such a transaction within the corporate powers of the respective companies. A bill to provide for this contingency has just passed in the legislature. The authority for the completion of the purchase having been obtained, the Flint & Pere Marquette will immediately begin the work necessary to change the main line of the Port Huron & Northwestern to a standard gauge and improve the remaining portion with new ties, rails, etc. In the United States Circuit Court, in this city, last week, an order was obtained dissolving the injunction, issued about a year ago, by which the Flint & Pere Marquette was restrained from acquiring the Port Huron & Northwestern. The purchase price, it is understood, was \$2,300,000. This sum is to be paid in 5 per cent. first mortgage bonds on the acquired property, the entire amount of said mortgage being \$3,500,000. The \$1,200,000 over the purchase price is to be used in improving the line from East Saginaw to Port Huron.

Fort Worth & Albuquerque.—This company has been organized at Fort Worth, Tex., to build a road 100 miles in length northwest from Fort Worth toward Albuquerque. The capital stock is \$1,000,000.

Georgia Southern & Florida.—The contract has been let to Morgan & Reynolds, of Macon, Ga., for building the extension of the road from the present terminus at Valdosta, Ga., to Lake City, Fla. The contract is to be completed in four months from the commencement of work.

Hartford & Connecticut Western.—The company has petitioned the Connecticut Legislature to increase its capital stock \$2,000,000, the amount to be thus used: \$700,000 to take up existing bonds, \$800,000 to build a line from Torrville, Conn., to Springfield, Mass., 19½ miles, and \$500,000 in improvement of present road in bridges and with heavier rails.

Illinois Central.—The agreement by which the Chicago, Burlington & Northern transfers to this company, for \$175,000, all its right of way and roadbed from a point in East Dubuque, Ill., to Portage Curve, has been confirmed by the Circuit Court at Galena, Ill. The companies have also entered into a trackage contract by which they are to use the tracks jointly, and to the further effect that the Chicago, Burlington & Northern is to have the right to run its trains through the Illinois Central tunnel at East Dubuque, and cross the bridge to Dubuque.

Kansas City, Wyandotte & Northwestern.—The company has engineers in the field under Mr. Baxter L. Brown, making preliminary surveys northwest to Beatrice, Neb., from the present northern terminus at Summerfield, Kan., a new town located on the line between Kansas and Nebraska in Section 6, range 10, east. The extension of the main line from Seneca, Kan., to Summerfield, a distance of about 24 miles, recently completed, has been opened for traffic. The grading on this extension was done by Reynolds & Skinner, of Kansas City, and S. L. Davis, of Seneca, Kan. The masonry work, bridging and tracklaying was also done by S. L. Davis. The depot and stock pens were erected by Fleming Bros., of Kansas City. The extension of the branch from North Leavenworth to Fort Leavenworth, a distance of two miles, has also been placed in operation.

The company has now in course of erection on the terminal grounds in Wyandotte, Kan., an engine-house, machine shop, blacksmith shop and oil-house. Frank Matthews, of Kansas City, is Chief Engineer.

Kentucky Midland.—The company has executed a mortgage upon the road to the Central Trust Co., of New York City, for \$5,000,000. The mortgage is limited to \$25,000 a mile.

Lampasas & Burnet.—A company with a capital stock of \$100,000 is soon to apply for a charter for a road to extend from Lampasas, Tex., on the Gulf, Colorado & Santa Fé south to Burnet, on the Austin & Northwestern, a distance of about 15 miles.

Louisville, Cincinnati & Virginia.—Grading has been commenced on this road again, and is now in progress from Irvine, Estill County, Ky., toward the mountains in the eastern part of Kentucky, near Big Stone Gap.

Luverne, Andalusia & Pensacola.—The company is making arrangements for the early commencement of the survey of the road from the southern terminus of the Northwest & Florida road at Luverne, Ala., southwest to Pensacola, Fla. The road will extend from Luverne through Mt. Ida, Leon, Hamptonville, Andalusia, Rome, Mason, Ala., and Mayo and Ferry Pass, Fla., to Pensacola. It will pass for 30 or 40 miles over an old survey made previous to the civil war, and of this, 28 miles is graded, and will need but little repair. The line will run centrally through a large pitch pine forest, extensive deposits of lime, phosphate, ocher and building stone; the country over which it will pass is exceptionally level, there will be no bridges of any importance, and the grades will be light. C. A. O'Neil, of Andalusia, Ala., is President, and S. J. S. Cawthorn, of Andalusia, is Secretary.

Lynchburg & Durham.—Codwise & Allen have been awarded the contract for building that part of the road between Lynchburg, Va., and Durham, N. C., which was not under contract.

Mexican Central.—President Wade says that \$33,525,000 of first mortgage bonds and \$5,855,000 of income bonds have been deposited, which insures the success of the refunding plan recently formulated.

Milwaukee & Northern.—The extension of the Ontonagon & Brule River road from Rockland to the line of the Duluth, South Shore & Atlantic, a distance of about 30 miles, is now under construction and is expected to be completed about Sept. 1 next. McIntosh Bros., of Milwaukee, are the contractors.

Mississippi & Leech Lake.—A survey for this road will soon be made from Little Falls, Minn., southwest to Elmdale and to a connection with the Minneapolis & Pacific or the St. Paul, Minneapolis & Manitoba. A. M. Morrill of Little Falls is president.

Missouri Pacific.—A survey is now in progress for a proposed extension of the Denver, Memphis & Atlantic Division from Chetopa, Kan., easterly through Baxter Springs to Joplin, Mo., a distance of about 35 miles. The construction of this line has not yet been decided upon.

The contract has been let to E. P. Reynolds & Co., of Wymore, Neb., for constructing 25 miles of the Kansas & Arkansas Valley road, south from Coffeyville, Kan. Of this line, 22 miles will be in the Indian Territory. A survey is in progress from the end of this contract to a connection with the line built last year at Wagoner, I. T.

New Roads.—A company has been formed at Cincinnati to build a double track railroad around the northern part of the city, to operate as a belt road, connecting with all the roads entering the city.

New York, Mahoning & Western.—The company has made arrangements with the Lake Erie & Western, by which it will use the terminals of that road in Findlay, and also its tracks through the town. The officers of this road claim that the extension west to Fort Wayne, Ind., will be in operation by July 1.

Northern Pacific.—The company has made plans to organize a terminal company, with a capital of \$15,000,000, for the purpose of building terminals for the road in Tacoma and at other points along the line.

Ohio Valley.—The extension north from the present terminus at Henderson, Ky., to Evansville, Ind., a distance of 10½ miles, is expected to be completed and in operation by April 1. Inclines are being put in at the crossing of the Ohio River, five miles above Henderson. The extension from Princeton southeast to Hopkinsville, Ky., 30 miles, has been located, but the contract has not yet been let. It is expected to commence work on this extension this month. The Central Construction Company, of Henderson, Ky., of which John A. Miller is President, has the contract for building the northern extension to Evansville. C. C. Genung, of Henderson, is engineer in charge of the road.

Oregon Railway & Navigation Co.—The directors of the Northern Pacific have approved an "arbitration contract" with the Union Pacific, which will result practically in a joint lease of the Oregon Railway & Navigation Co.'s property. The Union Pacific leased the line in April, 1887, on the basis of 6 per cent. yearly dividends on the stock. Legal and other objections have prevented the carrying out of the lease by the two companies. The "arbitration contract" provides for a board of five arbitrators; two each for the Union and the Northern Pacific companies, and a fifth arbitrator agreeable to both sides. It is understood that the presidents of the two companies will be members of the board. The contract provides for an equal division of expenses and profits in the management of transportation lines in a district embracing Oregon and parts of Washington and Idaho. The Northern Pacific turns in its Spokane & Palouse, Spokane Falls & Idaho and Coeur d'Alene branches, and the Union Pacific, the Washington Idaho and the Oregon Short Line. The stocks of these companies, or a majority of them, are to be placed in the hands of the arbitrators, who will vote on the stocks according to instructions from the Union and Northern Pacific companies. In case of a dispute the arbitrators will settle it. The purpose of the agreement is to secure absolute impartiality in the building and working of branch lines in the territory it covers. In furtherance of the project the Union Pacific agrees to transfer its lease of the Oregon Railway & Navigation and the stocks of the branch lines above named to a trust company to be selected, while the Northern Pacific agrees to share the expenses and profits of the lease of the Oregon Navigation property. The only important condition is that control of the stock of this company shall be lodged in the hands of the arbitration board. This will be accomplished by the transfer of the stock held by the Oregon Transcontinental Co. to the arbitrators, who will issue negotiable certificates for it. The voting power, however, will be reserved by the arbitrators. A meeting of the executive committee of the Oregon & Transcontinental Co. has been called to authorize the sale. A director of the Northern Pacific is quoted as follows: "The importance of this action can hardly be overestimated. We have solved, after a long time, the problem of the joint lease in a way that has been approved by the counsel of both companies. The settlement will insure harmony in the extreme Northwest for many years and end the reckless building of branch lines. The agreement has not been signed, of course, and consequently nothing has been done, but the letter from President Adams, of the Union Pacific, and the nearly complete unanimity of our vote are plain signs that the proposed arrangement will be carried through."

Oregon & Washington Territory.—A correspondent sends us the following facts concerning this road, known as the "Hunt System." Much of the information has already appeared in these columns, but is published as an interesting summary. The president of the company is G. W. Hunt, the well-known railroad contractor, of Portland, Or., and the Chief Engineer is Frank W. Ruffe of Walla Walla, W. T., from whom the information was obtained.

The road as constructed and now operated consists of 123 miles of railroad, the initial point being Hunt's Junction, W. T., located one mile north of Wallula Junction, on the Northern Pacific. The Pendleton Division extends southeast from Hunt's Junction to Fulton, Or., a distance of 34 miles. A branch extends from Stanton Junction, on this line east to Centerville, Or., a distance of 14 miles. The road, after crossing the Walla Walla River, 4 miles from Hunt's Junction, enters Vansycle Cañon, which it ascends with a maximum grade of 116 ft. per mile, the head of the cañon being 20 miles distant from Hunt's Junction, and Fulton, the present terminus of the Pendleton Division, is 6 miles north of Pendleton, on the Oregon Railway & Navigation Co.'s line, and the road will be extended to this point this year.

The Walla Walla division extends northeast from Hunt's Junction to Walla Walla, a distance of 53 miles, crossing the Touchet River 30 miles from Hunt's Junction, on a deck bridge, 40 ft. high. There is comparatively little bridging on the line, the company filling ravines and gulches in preference to trestling them. Bridging has been resorted to only where absolutely necessary for drainage purposes, or when fills exceed 35 ft. in depth. Two summits are encountered between Hunt's Junction and Walla Walla, both of which are surmounted by the use of a maximum grade of 1 per cent. each side. Two miles above Hunt's Junction the road enters Columbia Hollow, which it ascends to the head, a

distance of 10 miles, where it enters Eureka Flat, one of the finest wheat sections in the world. At Eureka Junction (22 miles from Hunt's Junction), a branch road continues up the flat a distance of 22 miles, the main line descending to the Touchet River.

From Hunt's Junction, to the head of Eureka Flat a distance of 42 miles, but one bridge, and that a trestle 50 ft. in length, is required. The grading up Columbia River was quite heavy though comparatively little rock work was encountered. On Touchet River there was one mile of heavy rock work. The alignment on the Walla Walla division is exceptionally good, the maximum curvature (S') being very rarely used.

This division will be extended this summer to Whetstone Hollow via Waitsburg and Dayton, W. T. The distance from Walla Walla to Waitsburg is 23 miles, to Dayton 33 miles, and to Whetstone Hollow 45 miles. The line was located last fall. The maximum grade is 85 ft. per mile, the alignment being good except in two or three instances where 10 deg. curves are required. Between Walla Walla and Waitsburg eight trestles will be required, ranging in height from 40 to 80 ft. Between Waitsburg and Dayton there will be two crossings of the Touchet River, the line following the valley of this river between these two towns. From Walla Walla to Waitsburg the line is located about half way between the Oregon Railway & Navigation Co.'s railroad and the foothills of the Blue Mountains, and passes through a continuous wheat field to Whetstone Hollow. The company was voted large amounts to aid it in building its line, as it gives large sections of the wheat country in Southeast Washington and Northeast Oregon an outlet to Puget Sound for their products.

The main line of the Northern Pacific, as it leaves Idaho and enters Washington, passes close to some of the finest wheat producing belts in the world, extending through this part of Oregon and Washington. These are known as the Walla Walla and Palouse districts, now producing immense crops, and the Big Bend district, hardly opened up yet. The two former have in the past been tributary to Portland, and the grain from these districts has been carried into that city over the Oregon Railway & Navigation Co.'s line till the past season, when, owing to the difficult and dangerous navigation of the Columbia river as compared with Puget Sound, and the consequent higher charges for charters to Europe, a large part of it was brought into Tacoma over the recently completed Cascade division of the Northern Pacific. Here it commanded from five to six cents a bushel more than in Portland, but, owing to the fact that the Oregon Railway & Navigation Co. had a number of branch lines and feeders running through this wheat belt, and the Northern Pacific had none, much of the grain had still to be carried into Portland over the lines of the former company.

The completion of this new road and the new branch of the Northern Pacific from Cheney to Davenport, W. T., 41 miles, and the branch of the Seattle, Lake Shore & Eastern west from Spokane Falls, will give another outlet for these sections of the country.

Ottawa, Morrisburg & New York.—This company has applied for a charter in Canada for power to construct a road from Ottawa to Morrisburg, Ont., via the villages of Metcalf, Vernon, Ormond and West Winchester, Ont. Bridges are proposed over the Ottawa and St. Lawrence rivers.

Pennsylvania.—It is stated that surveys are being made from South Fork station, on the Pennsylvania, past Cone-maugh Lake to the top of the Allegheny Mountains, about seven miles. The road will tap the beds of coal and iron ore in Adams Township, Cambria County, which have recently come under the control of Donohue & Co., of Greensburg, Pa.

Pennsylvania & New York Canal & Railroad Co.—Brown Bros. & Co. have bought from the Lehigh Valley \$4,000,000 five per cent consolidated mortgage registered 50-year bonds of the Pennsylvania & New York Canal & Railroad Co., guaranteed principal and interest by the Lehigh Valley. This is part of a total issue of \$10,000,000 authorized in December last, at which time this company was leased for 99 years to the Lehigh Valley. The mortgage was created to provide for \$1,500,000 first mortgage 7 per cent bonds maturing 1896, \$1,500,000 first mortgage 7 per cent maturing 1906, and to retire \$4,000,000 preferred stock held by the Lehigh Valley with the arrearages of dividends.

Petaluma, Sebastopol & Russian River.—The survey for this projected California road has been made from Petaluma to Sebastopol, Cal., about 12 miles, and will soon be continued to Guerneville, 14 miles further northwest. The route from Petaluma to Sebastopol is direct and level, but the route from Sebastopol to Guerneville is circuitous. There is a level grade to the head of Smith's cañon, where a short tunnel will be required in order to secure an entrance to the cañon. The maximum grade at this point is 80 ft. per mile for a short distance. Smith's cañon leads directly to the Russian River, from which there are two feasible routes to Guerneville.

Philadelphia & Reading.—The directors of the Northeast Pennsylvania have decided to extend the line from Hartsville to New Hope, Pa., on the Delaware River, opposite Lambertville. The Northeast Pennsylvania is a branch of the North Pennsylvania, which it joins at Abbington. At present it is nine miles long, but the extension will add 15 miles to its length. The road is owned and operated by this company. Work will be begun at once on the new line. H. K. Nicholls is engineer in charge of the construction. The company is also said to have completed surveys for an extension of the Camden, Gloucester & Mount Ephraim road from Mount Ephraim through Blackwoodtown to Spring Mill, N. J. The line will be 7½ miles long, and will cost about \$100,000.

Pittsburgh & Lake Erie.—The stockholders have decided to increase the capital stock to \$4,000,000, the increase to be used in paying off the indebtedness, completing a double track road from Pittsburgh to Youngstown, and straightening curves.

Pullman Palace Car Co.—A dispatch to the New York Tribune gives the following facts and figures concerning the company's present condition: From Aug. 1, 1888, to Jan. 1, 1889, 107 parlor, dining, sleeping and other cars, such as are used in the special vestibule system, have been completed and put into service. The company's interest in these cars has cost \$1,511,842. Thirty-two similar cars are now under cost of construction, at an estimated cost of \$378,000. The company has acquired 212 cars by purchase, of the Union, the Woodruff and the Mann companies, at a cost of about \$2,550,000.

The one-half interest in 58 cars heretofore owned jointly by the Atchison, Topeka & Santa Fé and the Pullman Company has been purchased at a cost of \$412,869. Sixty second-class sleeping-cars have also recently been purchased of the Atchison at a cost of \$261,918. Twenty similar cars from the Atlantic & Pacific will cost \$97,740. A one-fourth interest in 70 similar cars has been purchased from the Union Pacific at a cost of \$70,000. These investments aggregate \$5,282,070. The company has paid its debenture bonds,

amounting to \$955,000, which matured Oct. 15, and has increased its investment in freight and passenger cars, held under car trust leases, by the sum of \$1,210,000. The additions to its manufacturing plant thus far this fiscal year amount to about \$70,000, and will be considerably increased before 1890 to provide for the maintenance of the large number of cars which have recently been added to its equipment. The additional capital to meet these expenditures is what the \$5,000,000 new capital is to be raised for.

The sums named produce the following average prices per car: Vestibule cars, first named (107), \$14,129; other vestibule cars, \$11,812; Mann and Woodruff cars, \$12,028; Pullman cars on the Atchison, \$14,236; second-class sleepers on the Atchison, \$4,365; on the A. & P., \$4,887, and on the Union Pacific, \$4,000.

Regina & Long Lake.—The hitch in negotiations regarding the taking over of this road by the Canadian Pacific has been overcome and the road will, it is stated, be extended early in the spring to Saskatoon, thence to Battleford and Edmonton, in Alberta. A branch will be built from Saskatoon to Prince Albert, in Saskatchewan.

Richmond, Nicholasville, Irvine & Beattyville.—The locating survey for this extension of the Louisville Southern has been completed from Versailles to Richmond, Ky., about 35 miles, and, as noted last week, the contract for the grading and masonry on the 23 miles between Nicholasville and Richmond has been let to D. Shanahan & Sons, of Nicholasville, Ky. Work has been begun on this part of the line. The locating survey from Richmond to Beattyville, about 60 miles from Versailles, is nearing completion. As noted in another column, proposals will be received for viaducts and a bridge. J. H. Pearson, of Nicholasville, is Chief Engineer.

St. Louis & Chicago.—Judge Gresham, in the United States Court, at Indianapolis, has, on petition of the American Loan & Trust Co., who hold second-mortgage bonds, decided to appoint a receiver for that portion of the road that lies between Springfield and Mt. Olive, Ill.

San Diego & Eastern Terminal.—This company has been incorporated in California to build a road from Atlantic street, in San Diego, through Roseville and Pacific Beach to Del Mar, an estimated length of 20 miles. The capital stock is placed at \$500,000.

Sandusky, Ashland & Coshocton.—The contract for the construction of the section from Sandusky to Milan, O., has been let to a Buffalo firm, by President W. D. Crane, and it is stated that work will be commenced in a few weeks.

Savannah, Americus & Montgomery.—Proposals are being received for the clearing, grading, etc., on the extension from Abbeville, Ga., to the East Tennessee, Virginia & Georgia road, 25 miles, and R. E. Hardaway, Americus, Ga., is Chief Engineer.

Schuylkill East Side.—In the Senate of Pennsylvania a resolution was this week passed which calls for a statement from the last report of this road, showing the miles of road constructed, the amount of capital stock and the bonded indebtedness.

Shenandoah Valley.—The case of the Fidelity Insurance, Trust & Safe Deposit Co., of Philadelphia, against the Shenandoah Valley Railroad, involving about \$1,500,000, has been decided by the Supreme Court of Appeals of West Virginia in favor of the appellant, the Central Improvement Co. The decrees of the Civil Court of Jefferson County were reversed and the cause remanded. The Upper Court holds that the agreement of April, 1878, between the railroad and the Central Improvement Co. was valid.

Sioux City & Northern.—It is stated by the Chicago Tribune that the company has relinquished the three per cent. tax voted months ago as a subsidy to the company. The amount thus released is \$248,000, of which \$75,000 has already been collected by the county treasurer. The company has concluded negotiations for money to build the road without using the tax. The road will be built from Sioux City north 98 miles to Palisades, Dak., where it connects with the St. Paul, Minneapolis & Manitoba. An arrangement has been made with the Illinois Central to use its tracks as far as Merrell, 18 miles north of Sioux City, from which point construction begins.

Southern Pacific.—The Northern Railway of California has issued new bonds to the extent of \$21,000,000 at five per cent. for 50 years. They are to take the place of an old issue. The Union Trust Co. of New York is Trustee.

Spokane & Northern.—At a recent meeting at the Board of Trade at Spokane Falls, W. T., and the incorporators of the road the proposition of D. C. Corbin to build a road provided the people will subscribe \$100,000 to the capital stock, was accepted. One-half of this amount is to be paid on the completion of 55 miles of the road, and the balance in two payments, the last due when the road connects with navigable waters of the Columbia River and lakes, making connection with the Canadian Pacific.

Terminal City.—This company has been chartered in Nova Scotia to build a terminal road at the proposed eastern terminus of the Canadian Pacific in Nova Scotia. An extensive tract of ground has been purchased, and it is proposed to build extensive wharves and buildings at that point.

Tiffin & Fremont.—Surveys will be resumed on this road in early spring, and it is expected to let contracts as soon as the location has been completed and the estimates made. A survey has already been made from Marblehead southeast to Port Clinton, Fremont, Tiffin and Upper Sandusky, O., a distance of 65 miles. The line would make connections with the Lake Shore & Michigan Southern, Baltimore & Ohio, Toledo & Ohio Central, Pittsburgh, Ft. Wayne & Chicago, and several other lines. J. O. Sloan, of Lakeside, is General manager, and J. G. Kaney, of Toledo, is Chief Engineer.

Union Pacific.—The Carbon Cut Off Railroad has been chartered in Wyoming by W. H. Holcomb, T. L. Kimball and others of the Union Pacific to build a road in the interest of that company from Sulphur, near Carbon, northeast about 15 miles to coal fields.

Union Point & White Plains.—The contract for building this extension of the Georgia road, referred to under that title last week, has been let to R. T. Martin & Co., of Chattanooga, Tenn. The line is to extend from Union Point to White Plains, Ga., 13 miles, and when completed will be operated by the Georgia road. John C. Hart and A. H. Smith, of Union Point, are respectively President and Secretary.

Winnipeg & Hudson's Bay.—The Manitoba government has decided to aid this company by giving a cash subsidy of \$2,000 for 297 miles within the limits of the province. The act passed some time ago giving \$4,500,000 has been repealed.

TRAFFIC AND EARNINGS.

Traffic Notes.

It is reported that the principal roads in Michigan will not adopt the rebate form of mileage ticket.

The Union Pacific and the Chicago, St. Paul, Minneapolis & Omaha have made an open reduction in the grain rate from Nebraska points to Duluth. The rate has heretofore been 5 cents higher than to Chicago, but it is now 3 cents lower. It does not appear whether the grain taken goes east via the Sault Ste. Marie railroad lines or is stored in Duluth elevators.

The carriage manufacturers from all parts of the country met in Chicago last week and organized a Carriage Freight Association. They desire to have the classification of carriages reduced and have appointed a committee to confer with the Western Classification Committee.

Freight rates from New York and Atlantic seaboard points to Denver and common points, by water to New Orleans or Galveston, have been raised to a basis of \$2.74 first-class. It is stated that these rates include marine insurance, which was not the case with the old tariff. The actual advance, therefore, varies according to the value of the goods.

Receiver McNulta, of the Wabash, has notified Chairman Blanchard, of the Central Traffic Association, that the Wabash is losing business and that it therefore purposes to pay commissions on tickets. This is understood to be in consequence of the discovery that commissions are being paid by other lines east of Chicago.

An application for an injunction made in Waterloo, Iowa, to restrain the American Express Co. from transporting liquors from outside the State to Independence, has been denied by Judge Mey on the ground that it would interfere with inter-state commerce. It is believed that on the strength of this decision the wholesale dealers in liquors in the river cities will establish warehouses in the adjoining states and ship liquors from them into Iowa.

The Interstate Commerce Commission.

The Commission, in an opinion by Commissioner Schoonmaker, decides the case of Hostetter & Company against the Pennsylvania Railroad and others as follows:

Hostetter's Stomach Bitters, prior to the act to regulate commerce, were shipped under the Middle and Western States classification in the third class in less than car loads, and in the fourth class in car loads. Bitters generally in that classification were classed in first class in less than car loads, but were also put in the third class with the specification "manufacturers' account, released by shipper," under which these bitters were shipped. No other article except wine was so classified and shipped. After the act to regulate commerce, bitters were classed in first class with other liquids similar in character, marketable value, and manner of shipment. The class rates under the official classification are lower than under the one previously used. In October, 1888, by a change in the official classification bitters in carloads were placed in third class. On complaint of unjust and unreasonable rates, it is held by the Commission that a former special and preferred rate is not a fair test of the reasonableness of a present rate. The rate on bitters as at present classified compared with analogous articles is not so unreasonable as to demand a change of the classification of that particular article.

The Chicago Board of Trade has filed with the Interstate Commerce Commission a petition alleging discrimination against that city by the railroads charging higher rates for the transportation of live hogs than for packing-house products. All the railroads operating between the Missouri River and Chicago are charged with violating the provisions of the Interstate law.

Complaints of unjust discrimination in rates against the city of Memphis have been filed with the Commission by the Memphis Freight Bureau, against the Missouri Pacific, the Kansas City, Fort Scott & Memphis, and the Southern Railway & Steamship Association.

A complaint has also been filed with the Commission by James & Abbott, lumberdealers of Boston, alleging violations of the long and short haul clause of the law by the East Tennessee, Virginia & Georgia, and other carriers in the transportation of lumber to Boston from interior points north of Atlanta.

Trunk Line Rates.

Commissioners Fink, Blanchard, Midgley and Feithorn have been conferring at New York upon the modifications necessary in their rules and practice to conform their work to the recently adopted agreements between the presidents of the roads. Judge Cooley was in New York this week and called upon Commissioner Fink. It was stated that he was to take part in this conference, but it appears that he did not.

It is still charged that grain and provisions are being taken to the seaboard from Chicago by the weaker lines at secret rates considerably below the tariff.

East-bound Shipments.

The shipments of east-bound freight from Chicago by all the lines for the week ending Saturday, Feb. 23, amounted to 68,651 tons, against 66,560 tons during the preceding week, an increase of 2,091 tons, and against 57,263 tons during the corresponding week of 1888, an increase of 11,388 tons. The proportions carried by each road were:

	W'k to Feb. 23.		W'k to Feb. 16.	
	Tons.	P. c.	Tons.	P. c.
Michigan Central.....	6,750	9.8	5,307	8.1
Wabash.....	6,067	8.8	7,369	11.0
Lake Shore & Mich. So.....	6,096	8.9	8,108	12.1
Pittsburgh, Ft. W. & Chicago.....	9,219	13.4	9,334	14.0
Chicago, St. L. & Pittsburgh.....	8,798	12.8	7,888	11.5
Baltimore & Ohio.....	2,806	4.1	4,515	6.7
Chicago & Grand Trunk.....	15,831	23.1	2,961	4.4
N. Y., Chicago & St. Louis.....	7,042	10.3	5,781	8.5
Chicago & Atlantic.....	5,544	8.1	5,297	8.1
Total.....	68,651	100.0	66,560	100.0

Of the above shipments 3,902 tons were flour, 36,475 tons grain, 2,268 tons millstuffs, 3,919 tons cured meats, 3,544 tons lard, 8,757 tons dressed beef, 399 tons flaxseed, 960 tons butter, 1,637 tons hides, 43 tons wool, and 3,234 tons lumber. The three Vanderbilt lines together carried 29.7 per cent. of all the shipments, while the two Pennsylvania lines carried 26.2 per cent.

Cotton.

The cotton movement for the week ending Feb. 22 is reported as follows, in bales:

	1888.	1889.	Inc. or Dec.	P. c.
Interior markets:				
Receipts.....	54,471	39,490	L. 14,981	35.6
Shipments.....	77,213	49,317	L. 27,896	36.3
Stock.....	297,545	350,614	D. 53,069	21.1
Seaports:				
Receipts.....	96,350	69,024	L. 27,326	30.5
Exports.....	76,413	100,130	D. 23,717	31.0
Stock.....	884,949	868,631	L. 16,318	1.8

Railroad Earnings.

Earnings of railroad lines for various periods are reported as follows:

NEW YORK, LAKE ERIE & WESTERN.				
Month of January:	1889.	1888.	Inc. or Dec.	
Gross earnings.....	\$1,924,291	\$1,890,142	I.	\$34,109
Oper. expenses.....	1,381,704	1,357,849	I.	23,915
Less due leased lines.....	\$542,528	\$532,334	I.	\$10,194
Net earnings.....	177,215	171,755	I.	5,460
Four months—Oct. 1 to Jan. 31:				
Gross earnings.....	\$3,888,706	\$9,063,237	D.	\$174,529
Oper. expenses.....	5,839,408	6,010,536	D.	171,128
Less due leased lines.....	\$3,049,300	\$3,052,701	D.	\$3,401
Net earnings.....	786,040	822,411	D.	36,371
Net earnings.....	\$2,263,260	\$2,230,250	I.	\$33,010

NORTHERN CENTRAL.				
Month of January:	1889.	1888.	Inc. or Dec.	
Gross earnings.....	\$464,749	\$452,441	I.	\$12,308
Oper. expenses.....	315,231	324,194	D.	8,963
Net earnings.....	\$149,518	\$128,247	I.	\$21,271

PHILADELPHIA & READING.				
Month of January:	1889.	1888.	Inc. or Dec.	
Gross earnings.....	\$1,616,047	\$930,240	I.	\$685,807
Net earnings.....	735,614	100,642	I.	635,972

COAL AND IRON CO.				
Gross earnings.....	\$1,048,952	\$332,828	I.	\$716,124
Deficit.....	153,609	173,655	D.	20,046

BOTH COMPANIES.				
Gross earnings.....	\$2,664,999	\$1,263,068	I.	\$1,401,931
Net earnings.....	580,005	def. 73,013	I.	653,018

MEXICAN CENTRAL.				
Month of December:	1888.	1887.	Inc. or Dec.	
Gross earnings.....	\$440,638	\$510,056	D.	\$69,418
Oper. expenses.....	289,069	253,284	D.	14,215
Net earnings.....	\$211,569	\$256,772	D.	\$45,203

Year to Dec. 30:				
Gross earnings.....	\$5,506,252	\$4,886,579	I.	\$619,673
Oper. expenses.....	3,295,495	2,717,451	I.	578,044
Net earnings.....	\$2,210,757	\$2,169,128	I.	\$41,629

Mexican currency.				
Month of December:	1888.	1887.	Inc. or Dec.	P. c.
Ches., Ohio & So. W.....	\$183,117	\$203,176	D.	20,059 10.9
Net.....	77,153	75,453	I.	1,700 2.2
Ft. W. & Den. City.....	105,109	74,093	I.	28,416 38.0
Net.....	30,491	30,129	I.	362 1.2
Kentucky Central.....	37,408	81,137	I.	6,057 7.4
Net.....	43,148	31,456	I.	11,692 37.1
Lake Erie & Western	199,170	161,879	I.	37,291 23.0
Net.....	81,542	57,589	I.	23,953 41.5
Ore. Improve. Co.....	335,582	371,205	D.	35,623 10.9
Net.....	232	75,773	D.	75,541
Southern Pacific Co.:				
Pacific System.....	2,826,037	2,484,690	I.	341,347 13.7
Net.....	693,957	786,849	D.	92,892 13.3
North. Div. (Cal.).....	154,388	137,082	I.	17,306 12.5
Net.....	56,660	51,263	I.	5,397 10.5
South. Div. (Cal.).....	546,492	245,895	I.	300,597 122.0
Net.....	117,958	def. 95,491	I.	213,449
Arizona Division.....	175,551	234,704	D.	59,153 33.6
Net.....	98,252	98,252	I.	100,215 14.7
New Mexico Div.....	96,913	99,937	D.	13,024 14.7
Net.....	30,729	47,793	D.	17,064 55.4
Wabash.....	521,779	542,796	D.	25,017 4.7
Net.....	38,988	128,345	D.	89,357
Total (gross).....	\$5,462,716	\$4,897,223	I.	\$565,493 11.5
Total (net).....	1,571,224	1,470,489	I.	99,235 7.2

Twelve months—Jan. 1 to Dec. 31:				
Ches., Ohio & So. W.....	2,000,615	2,001,726	D.	1,111 2.2
Net.....	738,878	709,989	I.	70,889 9.6
Ft. W. & Den. City.....	1,094,040	719,068	I.	374,972 52.1
Net.....	399,579	302,828	I.	96,751 31.2
Kentucky Central.....	1,042,681	1,067,467	D.	24,786 23.7
Net.....	483,624	453,358	I.	28,271 6.2
Lake Erie & Western	2,167,789	2,087,331	I.	80,458 3.8
Net.....	809,940	806,827	I.	3,113 3.8
Ore. Imp. Co.....	4,876,051	4,167,707	I.	708,344 19.3
Net.....	990,570	1,065,247	D.	175,677 17.7
Southern Pacific Co.:				
Pacific System.....	35,117,240	28,459,739	I.	6,657,501 23.3
Net.....	12,420,696	12,437,272	D.	16,576 1.3
North. Div. (Cal.).....	2,085,938	1,727,245	I.	358,693 20.7
Net.....	947,339	782,445	I.	164,894 21.0
South. Div. (Cal.).....	6,668,600	4,138,399	I.	2,530,201 36.9
Net.....	1,668,938	1,172,291	I.	496,647 42.3
Arizona Div.....	2,660,140	1,756,519	I.	903,621 51.5
Net.....	277,236	702,787	D.	425,551 19.5
New Mexico Div.....	1,063,638	735,736	I.	327,902 36.4
Net.....	307,732	313,409	D.	5,677 1.1
Wabash.....	6,549,848	6,933,692	D.	383,844 5.8
Net.....	1,169,661	2,149,334	D.	979,673 84.4
Total (gross).....	\$65,106,778	\$54,064,738	I.	\$11,042,040 20.4
Total (net).....	20,361,845	20,567,069	D.	205,224 14.9

Total (net).....	20,361,845	20,567,069	D.	305,224	1.5
<i>Month of January:</i>					
	1889.	1888.			
<i>Baltimore & Ohio:</i>					
Lines east of O. R.	1,209,805	1,093,274	I.	116,531	10.6
Net.....	305,577	234,902	I.	70,675	30.0
Lines west of O. R.	356,402	371,495	D.	15,093	4.2
Net.....	2,402	25,868	D.	23,466	98.0
Camden & Atl. & br.....	36,041	32,034	I.	3,107	9.4
Net.....	def. 9,939	def. 9,221	I.	718	7.6
Clev. & Canton.....	28,151	26,533	I.	1,618	6.1
Net.....	6,710	5,706	I.	1,004	17.5
Likens Valley.....	89,390	90,342	D.	11,152	12.6
Net.....	def. 1,457	def. 7,864	D.	6,407	44.0
Mar. Col. & North.....	6,926	7,185	D.	2,590	37.3
Net.....	3,399	2,664	I.	1,135	51.0
Nash., Chat. & St. L.	293,080	270,806	I.	22,274	8.2
Net.....	121,172	112,609	I.	8,563	7.5
Natch., Jack. & Col.	16,558	15,699	I.	888	5.6
Net.....	5,438	4,696	I.	742	13.6
Summit Branch.....	119,560	150,973	D.	37,413	33.0
Net.....	119,560	150,973	D.	37,413	33.0
West Jersey & br.....	82,995	83,705	D.	2,746	3.6
Net.....	def. 23,178	1,220	D.	24,398	104.0
W. Va. Cent. & Pitts.	61,020	37,227	I.	23,793	66.0
Net.....	17,740	14,131	I.	3,609	20.0